

The Iron Age

A Review of the Hardware and Metal Trades.

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Transmission of Mechanical Power by Compressed Air.

Professor Barnard, in his report of the Paris Universal Exposition, truly observes that next in importance to the creation of a new motive power, may be placed any material improvement in the methods of making available the powers which we have. Nature often furnishes us with such powers in abundance in situations where they cannot be conveniently converted to use. The positions of water falls are determined by geographical accidents. These do not always conspire with the causes which promote the growth of towns and development of industries. If it were possible to transfer the immense forces which are thus unprofitably expending themselves, to points where there are hands to direct them, and material on which to employ them, they might be productive of incalculable wealth, and of immeasurable benefit to mankind.

The foregoing views, so clearly expressed, are eminently correct; but there is another power running to waste, which the engineer, ere long, will be called upon to utilize, viz., the power of the tides. Already a prominent association has been formed in France for erecting tidal motors, on a very large scale. Thus, while engineering skill has nearly exhausted itself in endeavors to improve the steam engine, a new field opens, boundless in extent, which will demand far greater abilities than those called for within the narrow bounds hitherto limiting the energies of the mechanical engineer. The grand scheme of utilizing the natural forces now running to waste, divides itself into two distinct branches. 1st. The requisite mechanism for receiving the force exerted by nature. 2d. The means for transmitting that force to desirable localities. It is the latter branch which we propose to discuss on this occasion. But, before entering on the subject, it will be proper to point out that it is not the natural forces alone which the engineer is called upon to devise means for transmitting. Indeed, with our present abundant supply of coal, the transmission of force developed by steam will be most frequently called for, since, however portable in its character, the steam engine cannot be applied in all places where power is required. The experience of late years has shown that the substitution of mechanical power for manual labor in driving tunnels, and for mining operations, has reduced the cost and greatly increased the amount of work done in a given time. But the presence of steam in tunnels and in the galleries of mines is wholly inadmissible; hence, small motive engines, operated by compressed air, have been introduced for operating the rock drills and other cutting tools. Not only has the work by these means been greatly accelerated, but the escape of the exhaust air from the motors has, in a material degree, tended to purify the atmosphere within the mines, rendering the work healthful which formerly proved so destructive to the miners.

The first question which presents itself in treating of the transmission of force by compressed air, is the size of the tube necessary to convey a certain amount of energy in a given time—pressure and velocity being the elements which determine the question. Fortunately, we are not without practical data on the subject, the engineers of the Mont Cenis tunnel having, some time ago, thoroughly investigated it. The result of their labors has been recorded in the Report of the United States Commissioners at the Paris Universal Exposition of 1867. The Commissioners state that, at the date of the report on the progress of the work in the tunnel during the year 1863, the operation was carried on at a distance of more than six thousand feet from the reservoirs of compressed air, and that nine borers were in operation with a force of two and a half horses power each. The tube conveying the air was very nearly eight inches in diameter, the air being under a pressure of six atmospheres, and its velocity in the tube three feet per second. The transmission of the power under these very favorable conditions was attended with no sensible loss, the pressure not being perceptibly less at the working extremity of the tube when all the perforations were in operation than when the machinery was entirely at rest.

The report of the commissioners furnishes a very full account of the result of the experiments conducted at Corsica, in 1837, by order of the Italian government, on the resistance of tubes to the flow of air through them. These experiments were made previously to the commencement of the work on the tunnel, the employment of compressed atmospheric air as a motive power to actuate the boring apparatus, being at the time considered a doubtful expedient. The report states that it was the aim of the investigation, not only to ascertain the absolute loss of force attending the transmission of air through tubes of certain dimensions at certain velocities, but also to determine what are the laws which govern the resistance when the velocities of the air and the diameter of the tube are varied. The following conclusions

were deduced from the experiments: 1. The resistance is directly as the length of the tube. 2. It is directly as the square of the velocity of flow. 3. It is inversely as the diameter of the tube.

The fact before adverted to, that in the actual working of the machines in the tunnel at Bardonecchia, no perceptible loss of power was experienced at a distance of fully six thousand feet from the reservoirs, must be attributed to the want of delicacy of the manometer of pressure gauge employed. Although insignificant at moderate distances and low velocities, the

recommend our engineering friends who may be called upon to transmit mechanical power by compressed air, not to aim at economy by employing tubes of very small diameter.

Having thus disposed of the first branch of the subject under consideration, let us now consider the mechanism needed to compress the air to be transmitted. At first sight the solution of the problem appears to be very simple, but due reflection at once suggests to the practical mind numerous difficulties. Considerations of weight, space, and first cost, of course, demand the adoption of a

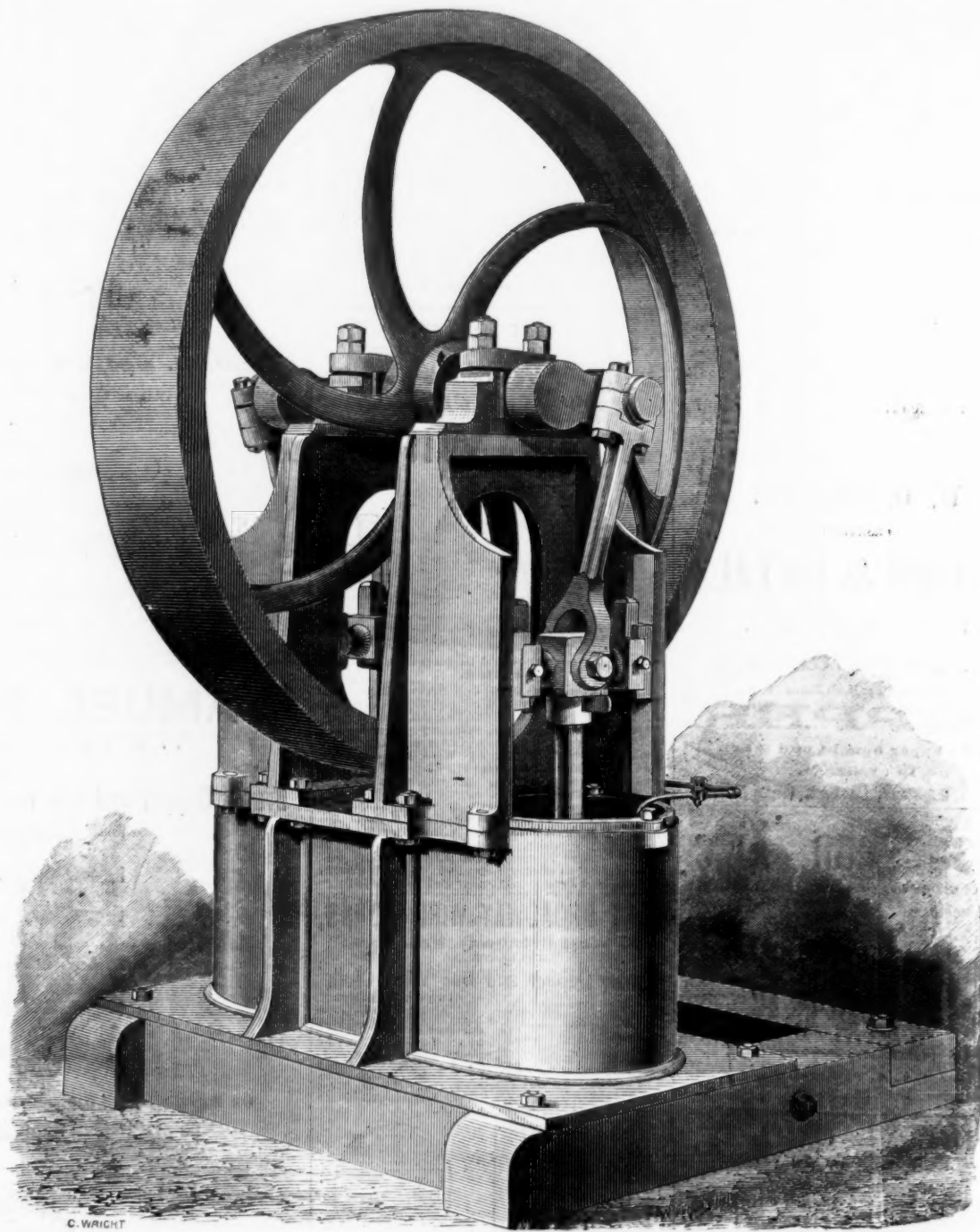
compressing pistons before entering the cistern. A glance at the sectional drawing will give a clear idea of the nature of the device and the mode of operation, which may be thus briefly described: A small pipe, communicating with a reservoir or other supply of water, is applied behind the machine, provided with a branch for each compressing cylinder. These branch pipes are bent downward vertically in such a manner that a stream of water flowing through each will fall on the top of the compressing piston, near its circumference. The compressing cylinders are suspended within a water cistern, sup-

on inspection, is very short compared with the length of throw of the crank; hence, the piston will remain for a considerable interval of time, near the top of the cylinder, during which time the necessary discharge of the water lodged on the top of the piston takes place. To prevent undue accumulation of water in the cistern, an overflow pipe is introduced at the side, as shown in the illustration. It should be particularly noticed that the air, while undergoing compression in the cylinder, is completely surrounded by metallic surfaces cooled by the circulating water. But this is not all. During the reciprocating action of the piston, the body of water lodged on its top washes the inside of the cylinder both during the upward and downward movement. Now, the speed of the piston is fully one hundred and fifty feet per minute, hence, an internal refrigeration is established, far more efficient than the external circulation, however rapid. The metal composing the cylinder of Captain Ericsson's air compressor, it will thus be seen, is actually cooled on both sides, a very remarkable and almost paradoxical achievement. Again, it will be perceived that the circulating cold water continually washes the top of the piston before entering the cistern. Accordingly, the entire quantity of water required for cooling during the compression passes over the piston at the initial low temperature, thereby subjecting the part of the machine that most needs cooling to the greatest amount of refrigeration. As regards lubrication, it is self-evident that no conceivable plan can be more efficient than that of actually washing the inside of the cylinder with the lubricating medium, both during the up and down movement of the piston.

Regarding the utility of cooling the compressed air, it needs no demonstration to show that refrigeration after the air has left the compressing cylinder, recommended by some engineers, is not only useless, but tends to reduce the efficiency of the compressed air as a motive agent. Obviously, if the air during its transmission from the compressor to the motor intended to be actuated, loses in temperature, it also loses in bulk. On the other hand, refrigeration within the cylinder during the down stroke is useful, as it tends to check the swelling of the volume of air under the piston, caused by the heat generated by compression, consequently diminishing the necessary motive power. In the machine under consideration, as we have seen, this useful refrigeration within the cylinder during the compression, is rendered thoroughly efficient by the means described.—*American Artisan for March.*

The Usk Bridge.

The superstructure of the bridge lately built across the river Usk consists of four spans of lattice girders, each 80 ft. 9 in. long. The girders are 26 ft. 6 in. apart from center to center, and the bridge has a clear width of 25 ft. 6 in. The girders are continuous over the whole length, and are 9 ft. 9 in. in depth, with flanges 2 ft. wide. They are composed of plates, angle and T-irons, and the flanges have a sectional area of 62 square inches at the center of span. The struts, which occur every 4 ft. 9 in. on both sides of the web, are each composed of T-irons connected by an intervening $\frac{1}{4}$ in. gusset plate. To the top and bottom of these struts, and to the webs of the girders are connected the diagonal tie bars, which have varying sections, lessening toward the center of the girder. The cross girders are formed of plates and angle irons 2 ft. 4 in. deep, resting on and fastened to the bottom flange of the main girder at every alternate strut. On the top of the cross girders four small longitudinal girders run throughout the whole length of the bridge. The rail sleepers are carried by four longitudinal rail bearers. The girders form a trough, in which the ballast for the permanent way is laid; the whole bridge is covered over with wrought iron 5-16 in. roadway plates. The piers consist of cast iron cylinders 8 ft. in diameter at the bottom, filled partly with brickwork and cement, and partly with cement concrete, the load of the superstructure coming upon the filling thus formed. At about low water level there is a conical diminishing pier reducing the 8 ft. diameter to 4 ft. 6 in. A substantial bearing on the solid column below is obtained by a flange, or disc. The columns are continued with this diameter to about 6 ft. above high water level, and then terminate with caps which receive the ends of the girders. All the cylinders of the piers have internal flanges faced in the lathe. These columns are placed in pairs 28 ft. 13 in. apart from center to center, and are strongly connected to each other by wrought iron bracing consisting of three heavy plate girders and tie bars, the whole being secured by bolts to the cylinders. The abutments are of stone, and to obtain a firm foundation on the left bank a very deep coffer-dam was necessary. On the other side, the rock being generally exposed at low water, it was simply levelled off, and the abutment raised at short intervals between tides until high enough to admit of its being built up continuously.



CAPT. ERICSSON'S AIR COMPRESSOR—Fig. 1. [For Fig. 2 see page 5.]

experiments proved that the loss becomes serious when the velocity and distance are considerably increased, since agreeable to the law before cited, the resistance varies as the square of the velocity. Consequently, when the velocity is six times greater than the low rate before referred to, or thirty-six feet per second, the resistance will be thirty-six times greater—the power developed increasing in the ratio of the volume of air delivered, viz., six times. It will be perceived, therefore, that while the length and diameter of a tube remain unaltered, and while the absolute resistance opposed to the flow of a current of air through it varies as the square of the velocity, the relative resistance is only as the simple velocity. It follows from the foregoing facts, that the power of compressed air varies as the product of its pressure and its volume; hence, when the pressure is constant, as the volume simply. But the volume delivered varies as the velocity multiplied by the square of the diameter of the tube. Now, as the resistance is inversely as the diameter, and the volume directly as the square of the diameter when the velocity remains constant, it follows also that under a given pressure and velocity the relative resistance (namely, the resistance divided by the power), will vary inversely as the cube of the diameter. Obviously, therefore, by enlarging the diameter of the tube, we may increase the power transmitted, and at the same time diminish both the absolute and relative resistance. In conclusion, we strongly

double-acting compressing cylinder; hence, the practicability of employing double-acting is the very first question that presents itself. Now, in double-acting cylinders both ends must be closed, consequently lubrication of the compressing piston must be effected from without. Supposing that means for effecting such lubrication have been devised (by no means easy), will the packing of the piston be preserved and abrasion prevented? In answering this question we must bear in mind that at even a moderate pressure the compression of the air generates a degree of heat which precludes the employment of oil, as it quickly dries up and ultimately burns. Water, if continually replenished, so as to make good the loss caused by the formation of steam, may answer for a short time. The dust drawn into the cylinder from the surrounding atmosphere, will, however, mix with the water and soon form a paste, resembling mud, on the top of the piston, productive of friction and abrasion of the cylinder incompatible with the functions of the piston.

The accompanying illustrations represent a perspective view and longitudinal section of a machine constructed by Captain Ericsson for the purpose of compressing air, in which the difficulties before referred to have been effectually overcome; the leading features being, that the compressing cylinders, open at the top, are immersed in a cistern of water through which a continuous circulation is kept up by a current of water which flows over the

ported by their upper flanges, which rest on the top of the cistern. Referring to the perspective view of the machine, it will be seen that the said water cistern forms a pedestal supporting the side frames on which the pillow blocks of the crank journal rest. It will also be seen that the side frames form slides which guide the cross-head of the piston rods. A band wheel, provided with a very heavy rim, to be driven by steam or water-power, is attached to the crank shaft between the pillow blocks of the side frames. It scarcely needs explanation that the object of making the rim of the band wheel very heavy, is that of equalizing the irregular resistance offered by the compressing pistons. The inlet valves which supply the atmospheric air to be compressed, are inserted in the pistons, while the outlet valves are placed at the bottom of the cylinder, the valve chambers of the latter communicating directly with an air conductor which leads to an ordinary air reservoir. Referring again to the sectional elevation of the machine, it will be seen that the sides of the compressing cylinder are perforated near the top, the position of these perforations being such that when the piston reaches the full up stroke, its upper face will not quite reach the under side of the perforations. It will be readily understood that, by this arrangement, a certain body of water will always remain on the top of the piston, while at the same time the perforations effectually prevent an overflow within the cylinder. The connecting rod, it will be found

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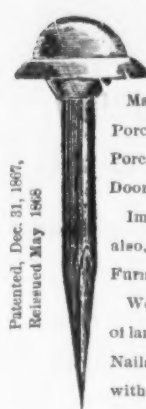
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The Wrought Iron of the Henderson Process for the Manufacture of Steel and Homogeneous Wrought Iron.

In our impression of the 29th ult., we noticed the Henderson process for the production of wrought iron, and gave comparative tests of the iron of this process with tests of puddled iron. We also gave tests of homogeneous wrought iron made by melting the muck bars of this process (from Chillington pig) in crucibles for comparison with the tests of wrought iron. We now wish to call attention to its advantages for the manufacture of steel and homogeneous wrought iron, by giving tests of the steel and homogeneous wrought iron made from the wrought iron of this process and tests of the steel and homogeneous iron of the most celebrated manufacturers, made from the purest ores in Sweden smelted with charcoal. The best qualities of English and German cast steel are made from Swedish iron, which is very costly. In this connection it will not be out of place to report the tests of the homogeneous wrought iron then published for comparison with similar kinds of metal made in Sweden from the purest ores smelted with charcoal. With this view we give tests for comparison of the homogeneous wrought iron, or mild steel, made by Mr. Christian Aspelin, of the Fagersta Works, Sweden, the tests of which were made by Mr. Kirkaldy.

Aspelin's, made for Paris Exhibition of 1867, which took the first premium:

Average breaking weight per square inch of original area	61,312 lbs.
Contraction of area at fracture	54.3 per cent.
Average breaking weight per square inch of fractured area	150,000 lbs.
Elongation	16.5 per cent.

Aspelin's, made for Vienna Exhibition of 1873: Hammered bars, 1 in. square, turned to 0.619 inch diameter:

Breaking weight per square inch of original area	65,220 lbs.
Contraction of area at fracture	54.3 per cent.
Breaking weight per square inch of fractured area	150,000 lbs.
Elongation	15.4 per cent.

Henderson's homogeneous wrought iron, from "muck" bars made from Chillington Staffordshire pig iron, which contained 1.0 phosphorus— $\frac{1}{4}$ in. octagon, as hammered:

Breaking weight per square inch of original area	63,870 lbs.
Contraction of area at fracture	56 per cent.
Breaking weight per square inch of fractured area	157,847 lbs.
Elongation	34.4 per cent.

The difference in favor of Henderson's, as compared with Aspelin's, of 1867, is as follows:

Breaking weight of fractured area	11.1 per cent.
Elongation	47.8 "

As compared with Aspelin's of 1873:

Breaking weight of fractured area	4.3 per cent.
Elongation	56.4 "

A comparison of the following tests shows interesting results. Jowett's cast steel for chisels, tested by Mr. Kirkaldy, were:

Average breaking weight per square inch of original area	124,832 lbs.
Contraction of area at fracture	17.0 per cent.
Average breaking weight per square inch of fractured area	159,253 lbs.
Elongation	7.1 per cent.

Krupp's cast steel for chisels from best Swedish iron, tested by a committee of engineers at Woolwich Arsenal, were as follows:

Average breaking weight per square inch of original area	115,160 lbs.
Contraction of area at fracture	5.7 per cent.
Average breaking weight per square inch of fractured area	125,343 lbs.
Elongation	0.2 per cent.

The analysis of Krupp's cast steel by Dr. Odling is:

Carbon	0.98 per cent.
Silicon	0.15 "
Manganese	0.21 "
Phosphorus	0.01 "
Sulphur	0.01 "

The cast steel from iron of this process from Yorkshire pig iron, tested by Mr. Kirkaldy, is as follows:

Average breaking weight per square inch of original area	119,130 lbs.
Contraction of area at fracture	26.2 per cent.
Average breaking weight per square inch of fractured area	161,501 lbs.
Elongation	8.8 per cent.

The Yorkshire pig iron contained 0.02 per cent. of phosphorus, the bar iron was chemically pure, and the steel contains 0.84 per cent. of carbon.

Krupp's soft cast steel for bolts, tested by Mr. Kirkaldy, is compared with the soft cast steel of this process, also tested by Mr. Kirkaldy.

Average breaking weight per square inch of original area	92,015 lbs.
Contraction of area at fracture	34.0 per cent.
Average breaking weight per square inch of fractured area	129,431 lbs.
Elongation	15.3 per cent.

Soft cast steel from iron of this process from Yorkshire pig:

Average breaking weight per square inch of original area	97,435 lbs.
Contraction of area at fracture	34.0 per cent.
Average breaking weight per square inch of fractured area	143,849 lbs.
Elongation	14.4 per cent.

Chisel cast steel from wrought iron from "level" hot blast Staffordshire pig iron by this process, tested by Mr. Kirkaldy, is as follows:

Average breaking weight per square inch of original area	113,915 lbs.
Contraction of area at fracture	10.2 per cent.
Breaking weight of fractured area	126,888 lbs.
Elongation	8.4 per cent.

The level pig iron contained 0.72 per cent. of phosphorus, the cast steel was pure iron with 90 per cent. of carbon.

Tests of chisel cast steel made from best Swedish irons by different authorities are given below for comparison. The breaking weight per square inch of original area are given:

Krupp's English arsenal tests	118,160 lbs.
Krupp's No. 1, Prussian arsenal tests	117,313 "
J. Brown & Co., Sir Wm. Fairbairn's tests	116,188 "
Chas. Cammell & Co., Sir Wm. Fairbairn's tests	130,308 "
Naylor & Vickers, Sir Wm. Fairbairn's tests	118,015 "
The average being	118,015 "

The steel from the wrought iron of this process is softer than that made from Swedish iron, and will take a higher carbonization, which will increase its tensile strength on the original area. This is shown by the strength on the square inch of fractured area being greater than the other kinds given here for comparison.

of which Krupp's may be considered the fair average.

The steel made from the iron of this process was the result of trials made to ascertain which of the reagents available for use in this process would produce the purest irons and consequently the best steel, and being all the results had from these three kinds of pig iron, indicate what may be expected from treating similar kinds of pig iron by this process, although better results may be hoped for when more experience is had.

Robinson's Rail System of Electric Signaling.

In our issue of January 6th we published an interesting description of the system of electric railway signaling, invented by Mr. Wm. Robinson. Shortly after we were desired by Mr. Frank L. Pope to publish a letter, which appeared in our issue of January 29th, claiming credit of the discovery of the principle which is the basis of Mr. Robinson's system. We are now desired to publish Mr. Robinson's reply to Mr. Pope, which we give below. We shall publish no more letters on the subject:

To the Editor of The Iron Age: In your issue of January 29th a letter appears over the signature of Frank L. Pope, on electric railway signaling, which, by stating too little, falsely, truth, belies science, and is generally calculated to deceive your readers, scientific and general.

Let me premise by stating that the article in your issue of January 6th, describing my system of rail signaling was true in every particular, and not calculated in the slightest degree to convey a wrong impression as to the origin of rail signaling or as to any other matter. Nevertheless, Mr. Pope seems greatly exercised lest credit shall be given to me, which he appears to claim, and to which neither of us is entitled, that of originating the idea of using the rails of the track as electric conductors for signaling purposes. This was old twenty years ago.

It now remains to notice some of the errors in Mr. Pope's statements. In connection with the signal used in the Broadway tunnel, which, as is well known, is only a few rods long, he says: "I connected the battery to the rails in such a manner that the wheels of the car would complete the circuit and operate an electric bell during its passage over a certain section of the track." It is rather unfortunate that Mr. Pope should make any allusion to this apparatus to support his claim to rail signaling. I made a personal examination of the signal device in the tunnel, and my distinct recollection of it is that line wires were used, terminating in a small spring plate over which the wheel passed. The rails did not enter into circuit at all, and the device, in various forms, is at least a dozen years old.

Again, Mr. Pope "found, by calculation"—it would be interesting to know by what mathematical process he "found" so much—that it ought to be practicable to convey an electric current through a line of fish-jointed rails for at least two or three miles, even in wet weather." He "tested this idea in 1870, for a distance of between one and two miles, and proved, by actual experiment, that a strong current could be conveyed, at least, that distance, and a magnet operated without serious difficulty." It would also be interesting to know the details of this experiment, the principle of its operation, and why we do not find the successful method of applying that principle in Pope's patent, for which application was subsequently made. Again, in his application for this patent, he "proposed to use the rails in sections of a mile or more in length," and, by November, he had "made a successful experiment on a New England railroad." He continues: "In this experiment I employed the rail circuit," &c. Here, it is evident, Mr. Pope wishes it to be understood that he used a section of rails, say, "a mile or more in length." Such was not the case, however. His own description of this experiment, in a paper read by him before the New York Society of Practical Engineers, and subsequently published, proves that he did not use the "rail circuit" at all in any proper sense of the term. On the contrary, he used line wires, terminating in short sections of rails—if I mistake not, only one or two rails in length. The train passing over the short rail section at one point closed the circuit through the line wires, thus exposing the signal, which was held in place by a "detent."

The train having reached a distant point, passed over another short section of rails, closing circuit through another magnet, which released the detent and reversed the signal. Since that time Mr. Pope has made mechanical alterations in his signal, but in those which he has put up, and which I have seen, he still adheres to the line wires, and short sections of rails as circuit closers. This is the "Bull-Pope" wire system above referred to. I know Mr. Pope will deny, as he has already done, that he uses substantially Bull's circuits. Those interested, however, are referred to Bull's patent for evidence. There is no case on record wherein Mr. Pope has ever worked a signal in wet weather through a one mile section, or even a half mile section of rails on the principle of operation described in his patent of July 16, 1872, to which he alludes; and, for the benefit of science, I will give him \$500, to pay his expenses if he will accomplish this interesting feat to the satisfaction of a committee of disinterested persons unacquainted with either of us. It cannot possibly be done, as I have repeatedly proven by actual experiment. Furthermore, the best possible corroborative evidence of this is the fact that Mr. Pope uses the "Bull-Pope" wire system instead of the Pope rail system above described. The latter is a scientific absurdity of the most glaring nature, and none should be deceived by the fact that it was patented by Mr. Pope.

Again, he seems anxious to fix the date on which I began to consider rail signaling, and to this end quotes from an article published in the *American Artisan* to prove that I had not considered it prior to September, 1871. That quotation proves nothing, as, if writing it to-day, it is doubtful if I would modify it in any particular. I have myself closed circuit and exposed a signal by simply bringing the line wire in contact with a wet railroad tie. To prevent this with an ordinary magnet on open circuit, a high magnetic adjustment is necessary. He also states that as late as November, 1871, I was still perfecting my wire system. This again proves nothing, for I might have added, also, that it was not until July, 1873, that the last of my wire signals was removed to give place to the rail system. As a matter of fact, however, long before the time that Mr. Pope filed his application for a patent, I held frequent conversations with my brother on the subject of using the rails as conductors. The method subsequently patented by Pope was canvassed and dropped as too "wild, absurd," as Pope puts it, for serious consideration, as nothing operating on the principle of opening and closing the circuit could be applied in using rail circuits properly so called. As early as March, 1870, I had occasion, in the course of my experiments, to employ the principle of short-circuiting. I finally arrived at the conclusion, after many months of patient study of the

subject, that from this principle alone, if any, results might be expected in using rail circuits, and my system, operating on this principle, is, in actual working, proving successful far beyond my most sanguine expectations.

Nevertheless, as regards Mr. Pope's system and my own, the question of priority of invention is of no possible consequence, as the two systems operate on different and distinct principles, his on the principle of opening and closing the circuit, mine on the principle of short-circuiting the current—the circuit never being opened—as clearly described in my issue of January 8; and there is no case on record wherein an inventor has ever been allowed to construe his patent as covering an apparatus involving a different principle of operation from that described in his patent. Indeed, the Patent Laws, 1870, sec. 26, expressly provide that in his application the inventor, "in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle so as to distinguish it from other inventions."

Mr. Pope says that my system differs from his "only in the arrangement of connections, so that the magnet would be unmade instead of made by the passage of the train." This is untrue; I have above shown that it differs also in principle, which latter involves the very important matter of the difference between complete and absolute failure on the one hand, and complete and absolute success on the other.

Again, he says his patent "covers broadly the combinations above referred to." This is entirely too indefinite to be tangible. From it he doubtless wishes to be inferred that my system is an infringement of his patent; but he will not, I think, venture to charge me, specifically, with infringement. Indeed, it is too late for him to make any claim in the matter, for he has already disclaimed my system over his own signature, and under oath, as I will show. On June 11, 1873, Mr. Pope applied for a patent which was granted Oct. 7, 1873, on a device which was merely a modification of that shown in his original patent. In this application he also showed my system, giving the connections in dotted outline merely, and attempting to disguise the whole by complications, and calling it a "modification" of what he showed as his invention. This he was compelled to disclaim, however, which he did in the body of the specification, as follows: "I do not claim, by itself, the method of operating a signal by means of a constant circuit, which is shunted out of the operating magnet by means of a connection formed by the wheels and axles of a locomotive or car, as shown in Fig. 2, except when combined with the devices and arrangements herein shown and described." The "devices and arrangements" are the complications referred to; these are of no value to Mr. Pope, as I will not permit him to use the "constant circuit" with "shunting" connections.

Yours, very truly, Wm. ROBINSON,
General Manager Robinson Electric Railway Signal Co.
St. Petersburg, Pa., Feb. 11, 1874.

The Mine Fires in the Wyoming Valley.

The *Wilkesbarre Record of the Times*, of the 28th ult., says: The Baltimore cave-in is unmistakably the cover for a fierce fire, having a tunnel or chimney of eighty or ninety feet for draft to the surface. The smoke poured out in volumes of clouds on Saturday morning, and still issues from the shaft more or less dense as the weather changes. From the roar and crackle of the fire below, it seems as if the vein above the Baltimore must be on fire. This up vein has several feet of pretty good coal, but more of a slaty mixture, which gives it the name in some parts of the valley of "dirt vein." In time it will be worked, where it has not been totally destroyed by careless working of the vein below, or by fires, as in this case.

In Kidder slope, the workmen are blessed with a good supply of fresh air and abundance of water, the black damp being confined by the current of ventilating air to gangways which can be avoided. The fan at Empire draws the damp in that direction, and the passage from Kidder slope to Empire shaft is considered dangerous on that account.

Five donkey pumps each throw two large streams of water on the fire, from opposite side, at the bottom of the slope, while pipes convey a further supply from the surface, and it has been driven a little forward from its original site. From small passages on various sides the workmen approach to watch the progress and direct the streams, the greater portion being shut off to keep air from it. The heat at times is intense, as you approach to get a glance at the fire. But the men work resolutely and cheerfully, with a feeling of encouragement as they better understand the situation.

Beside the dozen or more streams of water at the bottom of the slope, which will increase in effectiveness as the approaches to the fire are cleared from the rock and slate which have fallen upon them, so that the men can direct the hose to advantage. There are streams of water from the reservoir at the head of the Kidder slope. A large fan at mouth of the new slope drives fresh air in with the men so that they direct the water with great advantage and effect upon the fire.

The current had been up the slope before this, and had given the impression of a much more extensive fire than was really the case, and the prospect appeared on Saturday to be decidedly favorable. A six-inch iron pipe is laid from one of the streams coming in south of the slope bringing a large supply of water from that source, so that the rival elements are fully pitted against one another.

The West is taking hold of the Centennial with characteristic energy. The governor of Wisconsin having commenced the Centennial as deserving heavy support and assistance, and the Legislature having approved the recommendation, the merchants of Milwaukee have resolved "that it becomes all patriotic citizens imbued with the true spirit of loyalty to our magnificent land to heartily approve the decision," and appointed a committee of five principal merchants to "obtain an ample, liberal and patriotic subscription to the stock of the Centennial Board of Finance worthy of our public-spirited city for so noble and illustrious a purpose." The Milwaukee action lights a new fire, and will stimulate generous rivalry among the great cities and growing towns and villages of all the West to magnify an event of which they are not the least conspicuous and happy results. The practical method adopted cannot fail to procure speedy and appreciable gains, and attract more general attention there,

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SPOONER FLOOR.

PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, Feb. 16, 1874.

For the whole of the week past this city has been in a turmoil of partisan politics, with scarcely a thought devoted to anything else. To judge from the violent personal abuse, recriminations and "last cards," in the columns of the secular press, one would suppose that the candidates for popular suffrage would rather lead a forlorn hope, storm a battery, or engage in an Indian war than submit their reputations, their private affairs, and the habits and peculiarities of the members of their families, male and female, to the tender mercies of the average editor. What constitutes fitness for the Centennial Mayor of a city like Philadelphia may be uncertain, but one paper claims superior respectability for its candidate because, before becoming a politician, he made fine candy; while his opponent had advanced no higher in the struggle for life than to edit a newspaper—a queer scale by which to graduate the abilities of candidates for office. Fortunately, the election will be over before this appears, and barring a contest of the result, we shall breathe freely again. Whichever party wins, there is no prospect of any needed reform, or of more economical administration; this will be postponed until the great moral earthquake, which is surely impending over this country, and which will wipe out all existing political organizations, shall occur.

In manufacturing circles things are moving slowly, but perhaps more surely, than if forced. Labor is quiet, with the exception of some few strikes among weavers, a class which is generally disturbed. There are a few wrinkles, however, on the surface which deserve notice. One of these is a project to circumvent the chain makers by the introduction of a practical chain making machine. Now, chain making machines are not new; several are in existence, if not in operation, but a practical machine

of the welding hammer obviating the difficulty of thin scarfs in hand welding. The machinery is not experimental, but has been thoroughly tried, and the inventor is a practical, clear headed individual, who, to a liberal education and much natural ability, has joined a thorough shop knowledge of machinery, and is in that felicitous condition rarely vouchsafed to inventors—peculiarly easy—having attained a competence from his machinery business. With a laudable ambition, he proposes not only to engage in the manufacture of all sizes of chain for the American market, including those sizes hitherto entirely imported, but to export chains of his own manufacture to England, and undersell John Bull on his own soil. September, 1874, is the date at which he proposes to have American chain in the English market, and to submit it to any test of strength which the same diameter of iron will resist in any other form. In this patriotic commercial ambition the readers of *The Iron Age* will heartily join, and as the enterprise progresses, the machinery for a large works now being built, it

tion of this grade of true steel, always in demand and always likely to be, which cannot be overlooked.

While writing of steel, I must note the frightful accident at the Johnstown Bessemer Works during the week. Here the casting ladle, filled with molten metal from a converter, just ready to be run into the ingot molds, was cap-sized by the breaking of the jib of the crane suspending it, and the contents distributed over the men engaged at work. Of course they were all, more or less, seriously burned and some fatally. One man nearest to the falling ladle tripped, and fell in his effort to escape, thereby saving his life, the stream of molten steel passing just over his head, the heat singeing his hair. That man may console himself with the philosophical Frenchman, that "he is reserved for something worse."

Two iron vessels have been launched here this week—one, the *Harrisburgh*, an iron steam collier of 1500 tons, for the Reading Railroad Co., Cramp's yard, and the other, the *Dahlia*, a large tug for light house duty in the revenue

viously filled to the satisfaction of their employers.

Report of the Trustees of the Wood Estate.

The trustees of the estate of James T. and Charles A. Wood make the following report of transactions to February 5, 1874, made in settlement of the estate: The receipts from sales of individual property have been as follows:

Real estate, mortgages, etc.	\$167,368 14
Stocks	4,325 38
Rents	213 00
	\$171,906 52

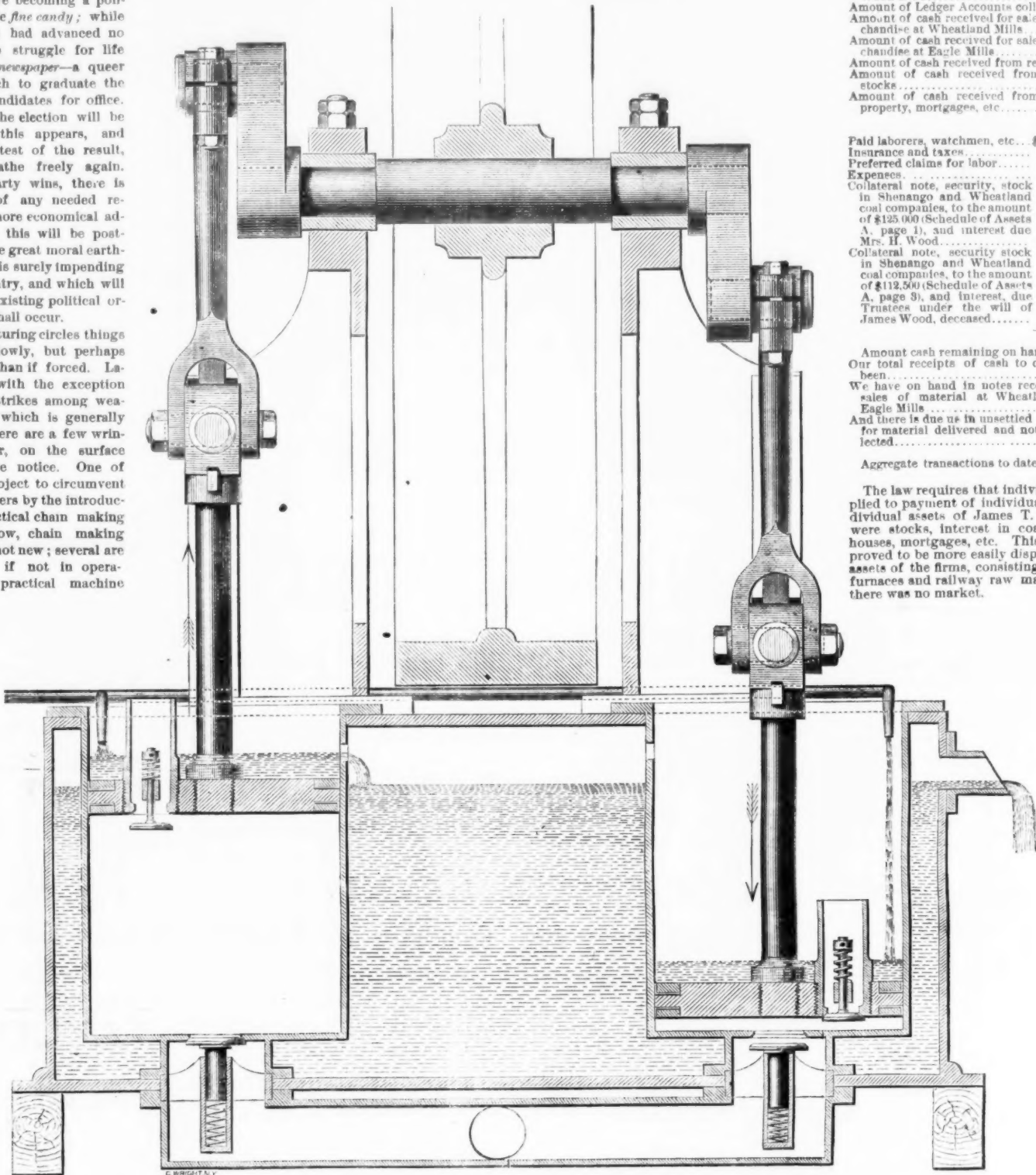
Paid Mrs. H. Wood, individual claim	\$149,628 00
Taxes	734 44
Insurance	142 50
Expenses	517 80
Mortgage, E. R. Sterling	3,240 00
	\$154,262 74

Amount of cash received from firms of James Wood, Sons & Co. and James Wood & Co.	\$ 2,478 66
Amount of Ledger Accounts collected	24,032 91
Amount of cash received for sales of merchandise at Wheatland Mills	31,472 69
Amount of cash received for sales of merchandise at Eagle Mills	23,156 91
Amount of cash received from rents	281 25
Amount of cash received from sale of stocks	505 64
Amount of cash received from sale of property, mortgages, etc.	21,408 34
	\$116,779 49

Paid laborers, watchmen, etc.	\$16,972 90
Insurance and taxes	11,351 54
Preferred claims for labor	19,316 86
Expenses	7,512 81
Collateral note, security, stock in Shenango and Wheatland coal companies, to the amount of \$125,000 (Schedule of Assets A, page 1), and interest due Mrs. H. Wood	33,712 25
Collateral note, security stock in Shenango and Wheatland coal companies, to the amount of \$112,500 (Schedule of Assets A, page 3), and interest due Trustees under the will of James Wood, deceased	27,606 61
	\$116,472 27

Amount cash remaining on hand	\$ 18,307 22
Our total receipts of cash to date have been	\$280,042 99
We have on hand in notes received for sales of material at Wheatland and Eagle Mills	103,015 42
And there is due us in unsettled accounts for material delivered and not yet collected	25,030 00
Aggregate transactions to date	\$408,088 34

The law requires that individual assets be applied to payment of individual debts. The individual assets of James T. and C. A. Wood were stocks, interest in coal farm, dwelling houses, mortgages, etc. This class of property proved to be more easily disposed of than the assets of the firms, consisting mainly of mills, furnaces and railway raw material, for which there was no market.



CAPT. ERICSSON'S AIR COMPRESSOR—Fig. 2. [For Fig. 1 see page 1.]

which should bend the iron, mechanically form the link, flatten the scarfs for the weld, and finally close the weld, making a stronger, because more thoroughly proportioned, weld than can be made by hand, is now. Such is the machinery now being constructed on a large scale, and shortly to be put in operation. I am not at liberty to give the precise locality or the names of the inventors and manufacturers engaged in this operation, but know both, and am satisfied the thing will be carried out fully. The process is conducted on two machines, one of which receives the heated iron bars for any size chain, a separate machine being, of course, provided for each size, bends the link to the proper form, cuts it off at the requisite length, and gives it the peculiar irregular twist known to those who have watched chain makers in their work. It further flattens the ends of the link, thus preparing the scarf for the weld, and deposits the link on a bar, proceeding *de capo*, as before; the whole operation being performed while the hand chain maker is taking the first squint at his link blank. When the bar upon which the links are strung is filled, an empty bar is substituted, and the links transferred to a heating furnace where they receive a welding heat. From this they go to a steam hammer, having a series of unique dies, in which, next to the bending machine, lies the gist of the invention. These dies weld the links perfectly, thoroughly and completely, and, in using these adjectives, I mean precisely what I state. Examine the best made hand chains, particularly of the smaller sizes not made in this country, and it will be seen that on each side of the weld, the link, to use a technical expression, is "robbed" of its iron, that is, the iron is drawn forward and into the scarf of the weld to obviate the difficulty of welding with thin scarfs. This weakens the body of the link to benefit the weld, and, as "a chain is no stronger than its weakest link," it is at this spot that the weakened iron breaks, and not at the weld. The machine welded links being formed in a regularly shaped die have not this objection, but the iron forms a gradual taper, the scarfs having been thoroughly and exactly prepared by the bending machine, and the force and ra-

will be reported from time to time for their benefit.

Another step of progress in matters germane to the trade we represent is attracting much attention from practical and scientific men, as well as from capital. This is a mechanical arrangement which would appear to have solved the problem of casting large masses of crucible steel, and must necessarily greatly increase and cheapen the production of that article. As is well known, no more expensive method of accomplishing an object is used than the present method of making crucible steel. From the construction of the furnace, except in the case of the Siemens' furnace, hereto applied, at least two-thirds of the products of combustion are wasted, while the vessels used for fusion are constructed of and of small capacity. By the improvement referred to, a series or group of converters is so arranged in a furnace above the ground as to receive all the heat of the fuel consumed, the method used being impossible to describe without a diagram, and by this means 2500 lbs. of crucible steel can be made from the ordinary materials in less time and by the same consumption of fuel that the ordinary melting furnace requires for the production of from eighty or sixty pound pots, or, respectively, 320 or 240 lbs. of crucible steel. Moreover, the services of the "teemer" in pouring the ordinary pot are dispensed with; the steel is tapped from the converters by a simple and effective mechanical arrangement, and led into a receiver where the normal temperature of fusion is thoroughly maintained, and from thence into ingot or other molds upon an entirely new system. It is evident that the product of two or more of these furnaces may be conducted to a common receiver, and hence ingots or blocks of any size may be made. Perhaps one of the greatest improvements of the process is that it does away entirely with the use of the expensive and uncertain black lead crucibles. The converters not being removed from the furnace and subjected to violent changes of temperature, can be made of a material far less expensive, and which is thoroughly refractory, lasting for many times the number of charges the ordinary crucible will resist. There are practical and commercial advantages in the produc-

service of the government. The latter was built at Neafy & Levy's yard.

The Reading R. R. Co. announces the stoppage of coal trains to the Port Richmond yards after the 16th inst. for 20 days, to allow for the work of excavating for the sub-grade crossing of the track at this point. The stock of coal on hand will be sufficient to allow of a full supply to vessels in the interim. I find among the exchanges the following waifs of iron information:

A mortgage has been recorded in the recorder's office of Schuylkill county for \$1,000,000. It is given by Severt, McManus & Co., of Reading, to the American Life Insurance Company, of Philadelphia, to secure a loan.

The Altoona Iron Company's rolling mill is now in full blast, having more orders and making as good, if not better, time than before the panic. Last month they lost only one day through some misunderstanding in regard to the operations of the coal mines.

The members of the Ohio Valley Iron Association, representing fourteen manufacturing and rolling mills in Ohio, Tennessee, Indiana, Missouri and Kentucky, met in Louisville on the 10th inst., when the following resolutions were adopted:

Whereas, The condition of the iron market renders it imperative upon the manufacturers represented in this association to compete with Pittsburgh in her prices for labor; and

Whereas, This association does not desire in any respect whatever to do any injustice to any workmen in the employ of any of its members; therefore, it is

Resolved, That those workmen desiring to be retained by any and all members of this association are hereby notified that unless they report to the officers of their respective mills their readiness to go to work on or before the 20th of February, at the Pittsburgh prices, as proposed on the 10th of December, they will be discharged, and a printed list of such workmen so discharged will be furnished the other members of this association, who will not employ them.

Resolved, That all workmen going to work on the basis proposed December 10 shall have preference in future, from all the members of this association, for situations which they pre-

The sales of the great portion of the merchandise, reported above, were made during last summer, and before the panic, consequently the prices realized were very satisfactory, but to make sales we were compelled to wait long time, as railway material, and stock used in making same, had, in July and August, commenced to feel the depression that culminated in the disastrous September decline.

The causes indicated above, no doubt, forced the suspension of the California and Texas Railway Construction Company, whose paper, to the amount of \$288,800-50 is held by the trustees, and the paper was protested at maturity.

We are glad to report that all preferred claims for labor, all individual claims, and all claims secured by collateral, have been paid, so that all assets now in our hands will be applied to the settlement of the business of the firms of James Wood, Sons & Co. and James Wood & Co. The amount of claims already proven against the above firms is \$2,005,000; the amount they may be liable for (including indentures), and not yet proven, is about \$100,000, and of disputed or contested claims ten thousand dollars. We did not deem it to the interest of the creditors to force the property on an unwilling and depressed market, such as has existed since we took possession. Business matters are brightening, values advancing, and we will push sales as quickly as can be done, without sacrificing the important interests in our charge.

Respectfully submitted,

R. J. ANDERSON, J. J. SPARKMAN, Trustees.
H. W. OLIVER, JR.,

The undersigned committee, appointed by the creditors of James T. and Charles A. Wood, advised and recommended the action of the trustees, as detailed in above statement.

The matter of distribution of moneys realized from personal assets and payment of collateral notes, was by us referred to the United States District Court, and we were instructed to direct the payment of the individual claims and collateral notes.

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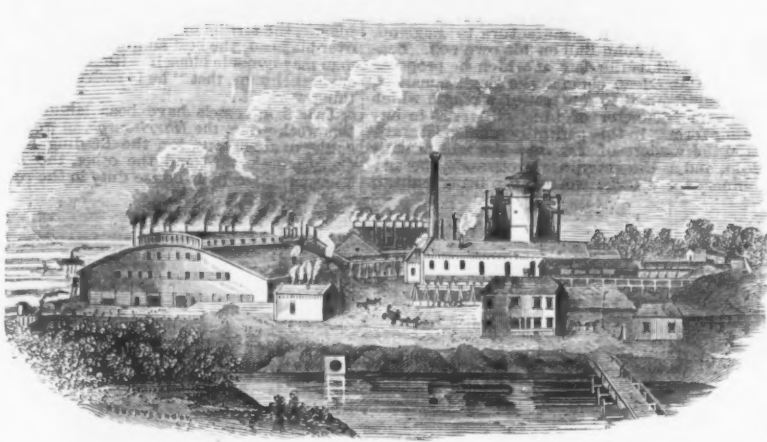
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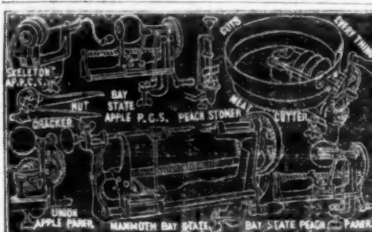
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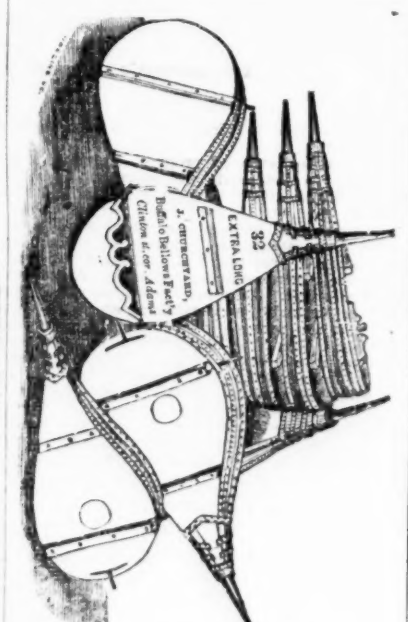
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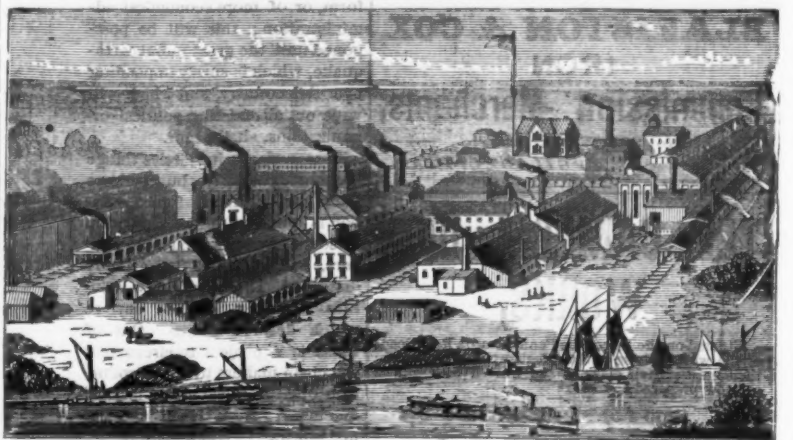
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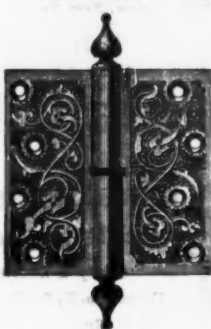
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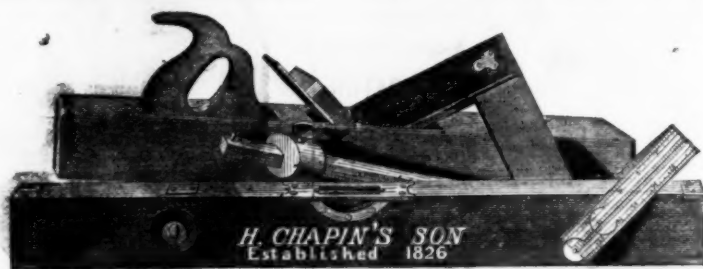
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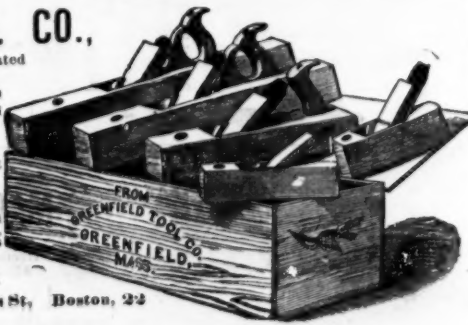
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**American Iron, Capital and Railways.**We take the following from an able contemporary, the *North American*, of Philadelphia:

The production of iron by the British mills last year was over six millions of tons. The present capacity of the American mills is over four millions of tons. We can, then, equal two-thirds of the British product if we have the market, and the question is how can we get it? We shall not do so by reducing the tariff continually, since that invites foreign iron more and more. We shall not get it by keeping up a universal croak against the steady extension of the railway system—which has done so much for the advancement of American civilization, and which has afforded, upon the average, a most profitable investment for American capital—since the railway consumption of iron, 1,400,000 tons per annum, is the leading item in the market. But we shall do it by maintaining protective duties on imports, and by restoring confidence to the railway companies, and resuming our general operations for the extension of the system.

In view of the sudden and alarming prostration of industry and trade during the panic and revulsion, we deemed it best to attack boldly the main point, which was the general distrust of the railway securities, because if that continued recuperation was impossible, the connected interests being so vast that a paralysis of railway credit seemed to involve a danger of general bankruptcy. We are happy to say, now that the crisis is past, that railway credit is rapidly recovering, that things look hopeful, and there is quite a good prospect of renewed activity in the spring. The prices of iron have fallen so much as to favor railway construction, while for a considerable time the high prices were very much against it. We are told that the West generally has not been much affected by the panic, but this is probably a Western exaggeration, as the Western railways produced the most failures to pay interest and showed the most serious falling off in business, and the Western hotels scarcely paid expenses. But the railway returns for December evince recovery of tone, apparently inspired by the belief that the four great seaboard cities are again able to help them.

The feverish spirit of speculation exhibited at the stock exchanges of New York and Philadelphia has satisfied thousands that they might do very much worse with their money than to put it in railroads, for though they may have to wait for a return on the investment in the latter the return is sure, whereas, in speculation, the odds are generally in favor of loss. If the leading iron men were to agree to organize a general railway movement, the object of which should be to wipe out all railway discredit by taking up the failed lines and putting them on a strong and substantial basis, the whole system would immediately feel the effect, and capital would once more flow freely into that channel. To see this illustrated we have but to look at the case of the Erie Railroad, the plander of which by financial handiwork was a standing warning to capitalists both foreign and domestic, and the recovery of which at once infused new life into railway credit. Another instance is afforded by the case of the Kansas Pacific Railway, which, in consequence of the panic and the sudden paralysis of railway credit, was unable to meet the regular interest on its bonds. Yet, so soon as the real condition of the company could be examined calmly in the light of returning reason, every body saw that with such a work a failure to pay interest must be temporary only, as the company is the main dependence of the State of Kansas and the Territory of Colorado, and owns over eight hundred miles of railway.

To appreciate properly the value of these ventures of American capital we have only to examine attentively those made by British capital in all parts of the world. London has ventured in the Russian, South American, Italian, Indian, Australian, Spanish and American railways more money than would have paid off the whole of our war debt at its greatest height. It is by these investments that she has commanded foreign markets for her iron. And in none of these investments has there really been any better chance for a return than in the case of our own undertakings. We are accustomed to measure British railway enterprise too much by the mileage in the British isles, whereas the enterprise has been world-wide like British commerce. The spirit of British commerce has gone abroad all over the world, while ours has been internal. Each has wrought wonders in its way. So it has been with railways and capital.

As the market for our manufactures and our agricultural products has been chiefly sought at home, so the railway spirit must find its chief development and best field of action at home; and, in connection with it, as British capital finds its natural application in foreign lands, American capital finds its natural application on its own soil. This arises from no narrow-minded feeling on our part, but from the fact that we have an immense domain with boundless resources, and a population consuming more of everything per head than any other now existing. It never occurs to any one in England that this outflow of capital all over the world should be arrested, because every man of sense sees that it makes all the world the debtor to England, and the rich returns are visible in a stupendous commerce. But by some strange concurrence of events it seems to be thought here in the seaboard cities that we must arrest the outflow of our capital to fertilize the vast interior of the Republic which has been our quarry.

Very much of the capital we send to the West goes in the shape of rails, iron bridges, car wheels, cars, locomotives, &c., the construction of which gives employment to labor at home. We presume that exchange between the seaboard and the interior is similarly adjusted in other ways. We receive bonds, shares

of stock, barrels of pork, beef, flour, and all that the West has to send us, and we send back rails, engines, dry goods, hardware, groceries, &c. The West cannot become independent of us while she goes on drawing thus upon our resources to build her railroads. Her cities may become metropolitan, her tradesmen enterprising, her manufactures extensive; but the debt she is ever accumulating here gives us command of the Western trade. Thus, then, we see that the true interest of all the seaboard cities, importers and manufacturers, is to go ahead with Western railroad investments, since the capitalization of our ventures and the return of interest upon the investment must be ever increasing.

The weak point of the American railway system is not at the West, but at the South, where all investments of capital have fallen into disrepute in consequence of the chaotic condition of the State finances. Large numbers of railways are directly affected by the repudiation of the State bonds issued to aid them. We should think it would pay the Northern capitalists concerned in Southern bonds to appoint a general committee to make some arrangement for the reorganization of Southern credit. If the Southern railways could be thus put in a fair way to obtain increased capital, they would all be improved very much, and would be able to use at least 300,000 tons of iron in that section this season. They do not want new railroads there so much as the improvement of those they already have, and that cannot be made without more capital.

A Copper Whistle of the Carboniferous Age.

The *Seranton Republican* tells the following curious story with a gravity which is almost as amusing as the story itself:

"On Saturday afternoon a miner named Martin Loughery, working in No. 10 mine of the Pennsylvania Coal Company's Works, at Pittston, while in the act of breaking a massive piece of coal, which he had dislodged, discovered embedded in the center of it what appeared to be a small wooden box of an oblong shape. Upon touching the box it crumbled into dust like a fungus, and disclosed a copper whistle, having a flared mouthpiece, and in other respects shaped like our ordinary tin whistles. The miner brightened it up, applied it to his mouth, and made it sound, doubtless, for the first time in centuries. The spot where it lay is about one hundred feet beneath the surface of the earth. How many seasons have been swept over the terrestrial sphere, by the never ceasing tide of time, since this memento was laid carelessly aside by some hand of a former age, is a question to form food for the reflective mind. The voice that was wont to charm the single pipe into music must have been hushed in the age of long ago. Yet the copper whistle remains to attest in favor of the science of geology. It should be preserved in some of our museums, or by some historical society, together with a specimen of the structure in which it has slept for ages. Who shall say, in the face of such a fact, that our country has not known a civilization anterior to that imported here by Columbus, or that a race of enlightened human beings did not flourish and fade on this grand hemisphere ages and ages ago?"

This is very interesting, certainly, but it is much to be regretted that the gentleman of paleozoic antiquity who made this whistle, and whose breath "was wont to charm the single pipe into music," did not leave his daguerrotype in the box along with it, also his card. It would be interesting to know his name, but still more so to see his picture. Of how much greater antiquity the art of making copper whistles must be than is supposed.

Leather Cardboard for Roofing Purposes.

A French writer, discussing the respective advantages of the several varieties of paper roofing lately introduced on the Continent, says:

Although the advantages of bitumen cardboard for covering slight or temporary structures are generally known, many inconveniences arise from its use. Its rapid decomposition and want of solidity when the oily parts of the bitumen evaporated, necessitated such frequent recoating that the system became expensive rather than economical. A new substance has, however, been lately discovered, known as leather cardboard, which, from its solidity, suppleness and durability, seems likely to supplant the old method of roofing. It is composed of solid and tough materials, cemented together by an oily and durable plastering, with which they are thoroughly impregnated, thus producing a substance entirely waterproof and far more lasting than bitumen cardboard, which, formed as it is of a spongy, compressible matter, and only covered with a thin layer of pitch, obviously possesses neither of the qualities essential to any material for roofing—that is, absolute impenetrability added to great powers of resistance.

The leather cardboard, on the contrary, is so waterproof and tenacious in its composition that atmospheric changes have no effect upon it; it can bear the most intense heat and cold without injury, and is capable of resisting not only the heaviest rain, but also the effects of continuous snow.

Being of light weight and easily fixed, the leather cardboard has the advantage of being far more economical than ordinary methods of roofing with zinc, tiles or slate.

Employed, as it has been for several years, as much in private structures as for camps and public edifices, its advantages have been proved by experience, and ten medals awarded to the inventor at different exhibitions have justly recompensed the improvements he has effected.

The cardboard shod be laid on planks of wood, touching each other, and at an inclina-

tion of about five inches. The bands of cardboard should be unrolled lengthwise on the roof, commencing at the gutter, and going gradually up to the top.

Care must be taken to stretch the cardboard well, and to make each sheet lap over the other above two inches, securing them by nails at intervals. The whole is ultimately fixed from the top to the bottom of the roof by little wooden linteels, less than an inch wide, nailed at a distance of about 18 inches from one another. A coating of hot pitch should then be applied.

The sheets of leather cardboard being sanded only on one side, care must be taken to fix the smooth side to the planks. The price varies according to the thickness of the sheets, but is much the same as that of ordinary cardboard.

The First Steel Rail.

A correspondent of *Iron* tells the following interesting story of the first steel rail: In the early part of the year 1857, Mr. Mushet, the eminent metallurgist, cast for the Ebbw-Vale Iron Company some blooms of Bessemer steel. Some of these were rolled into double-headed rails at the Victoria Iron Works. One of the rails, after being inspected by Mr. Mushet, was sent to Derby station, where it was laid down at a place where there was the greatest amount of traffic. Ten years after, Mr. Mushet wrote to the chief engineer of the Midland Railway, at Derby, asking what number of trains passed over it daily, and whether the railway company would dispose of the rail to him. In reply he was told that the number of trains daily passing over the rail was 250, but that might be at least doubled for detached engines and tenders, and the engineer added: "I should not be inclined to recommend the sale of the rail, but if it is ever taken out you shall have the refusal of it."

In June of last year Mr. Mushet wrote again about the rail, reminding the engineer of his promise, and this was the reply: "I am sorry to find that the rail referred to in your letter of 16th June was taken out and used about ten days before the receipt of your letter."

It is undoubtedly a great pity that this Bessemer steel rail, the first cast steel rail that was ever laid down upon any railway, should not have been preserved. A hundred years hence it would have possessed great value as an object of interest and curiosity.

The facts of the case are these: During sixteen years 250 trains and at least 250 detached engines and tenders passed over this line daily. Taking 312 working days in each year, we have the enormous total of 1,252,000 trains, and 1,252,000 detached engines and tenders which actually passed over this rail from the time it was first laid.

The uses of wire-rope—at first almost entirely confined in its practical application to the standing rigging of ships—are now almost innumerable. Among the most prominent of these uses, in addition to the standing and running rigging of ships, may be mentioned submarine cables for telegraphing; suspension bridges; guide, incline and flat ropes, for mining purposes; special forms of rope for engineering uses; pneumatic telegraphs; traction ropes for tramways; steel plow ropes; ropes for the transport of sugar-canes; tent stay ropes; endless driving bands; bullock traces; telegraph running and stay strand; fencing strand; ropes for stazing; railway single cords; clock lines; clothes lines; sash lines; lightning conductors; gilt and silvered cords for hanging pictures, etc., etc. Many other applications might also be enumerated; while for all these purposes they are believed to be stronger, lighter, cheaper and more durable than any other article thus employed. These ropes are manufactured from cast, homogenous and Bessemer steel; also, from charcoal and common brands of iron, bright or annealed, and from copper and brass.

A new snow-plow has been tested on the Flushing and North Side Railroad, Long Island. It is built on a platform car about 30 feet long. In front is placed a frame 12 feet long, elevated at an angle of 45 degrees, the top of which is on a level with the front of the car. The part that first strikes the snow is at the bottom of this frame. It is an iron plate and nose, and receives the snow, which is then caught up by iron buckets, four feet wide and eight inches high, attached to endless bolts of rubber, revolving on cylinders of oak and iron, and thus carrying the snow to the tops of the frame and throwing it upon the roof.

A Board of Manufacturers have concluded to hold an exhibition in May next at Portland, Maine, to be called the Portland Industrial Exhibition. The object is to gather specimen products from all the factories and workshops under one roof, advertise the wares of all who exhibit, increase the sale of Portland manufactured goods, draw the attention of capital and labor to the city, and demonstrate the importance of Portland as a manufacturing center. The idea is commendable, and will no doubt stimulate manufactures, and ultimately be of material benefit to the State.

A dispatch from St. Johnsbury, Vt., under date of February 7th, informs us that Fairbanks & Co. are now manufacturing 15 tons of iron daily into scales, their orders being largely in excess of those for January last year. The company made last week almost 300 scales, and have just received an order from Chicago for twenty-two 500-bushel hopper scales, and another for twelve railroad track scales.

The fountain in front of the City Hall, in this city, which has long been in course of construction, is now receiving the finishing touches. Handsome bronze mountings are distributed to good advantage; the center is ornamented by a profusely decorated cross, and on each of the four corners is a heavy lamp, with beveled edged panes of glass.

The organization of a new company to lay a light cable from the coast of Great Britain to Halifax, via the Azore Islands, is announced. The capital is £250,000, and the prospectus, which was opened recently, says it is the intention of the company to convey messages over its cable at the rate of one shilling per word.

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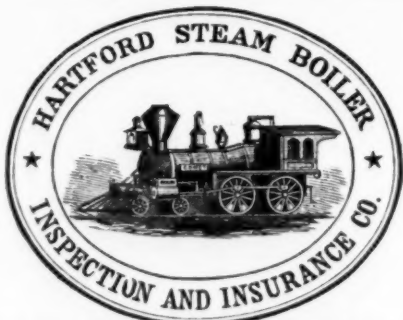
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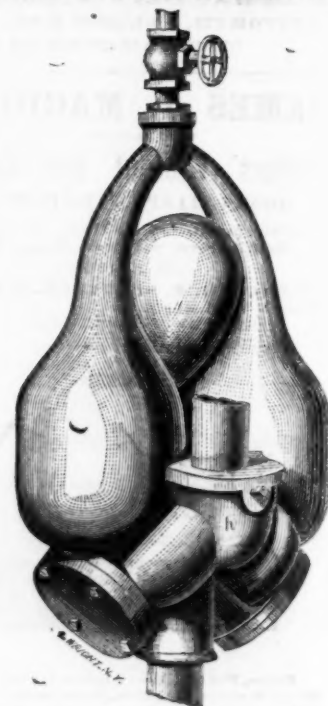
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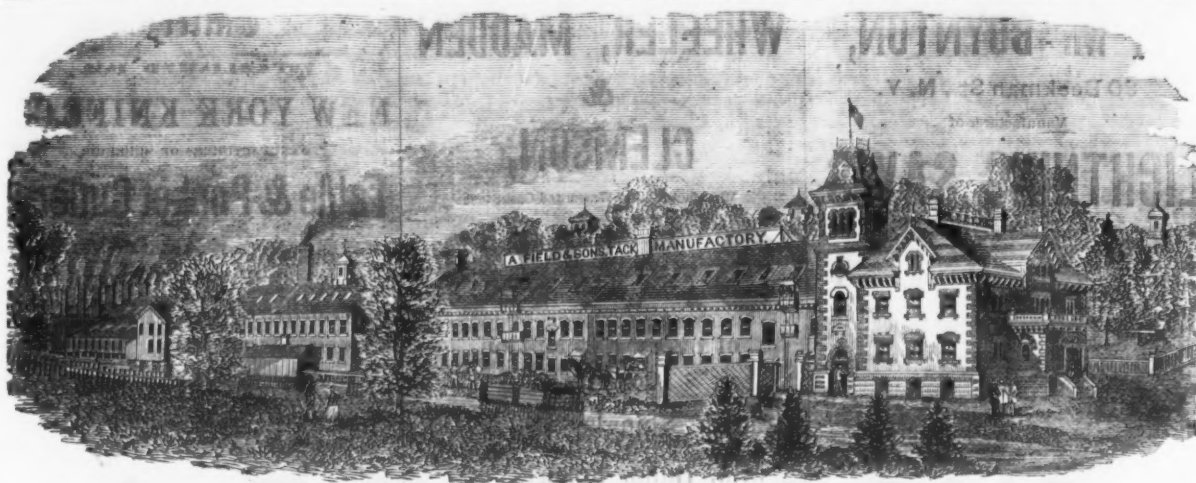
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BUSINESS ITEMS.

PENNSYLVANIA.

New machine works are being erected at Lebanon by P. L. Weimer, of the firm of P. L. Weimer & Bros. Their old establishment will soon be started.

The Manayunk Machine Works, at Philadelphia, have been established since 1857. The company manufacture machinery, shafting, pulleys, &c., employing about 35 workmen. The shop has a frontage of 200 feet on Main street, and is supplied with a full equipment of modern machinery, &c., necessary for conducting this branch of manufacture. The proprietors are Muldoon & Hutton.

It is stated that arrangements have been made by which the Johnstown Mechanical Works will shortly be run again to their full capacity.

Alexander Foster & Co., proprietors of the Fairmount Steel Works, Philadelphia, are manufacturing a large amount of cast steel; also, machinery steel, frog plates and points, cast spring steel, and all kinds of steel forgings, made to any pattern. In the works are six four pot melting furnaces, and three steam hammers. The company employ 30 workmen. The mill has a capacity of eight tons per week.

It is rumored that the railroad company is at present engaged in negotiating for a tract of land in the vicinity of Derry Station, Westmoreland county, with the view to erecting thereon the necessary shops for the building of palace stock cars, and, also, shops for repairing locomotives that ply on the western division. If rumor is correct the shops that are to be erected will be on an extensive scale, and will be fitted up with the most approved machinery of all kinds, while Derry Station will at once take rank with the important points along the line of the road.—*Allegheny Tribune.*

William M. Kaufman & Co. are building a new iron furnace at Sheridan, Lebanon county. This concern are the proprietors of the Sheridan Furnace, at Sheridan Station. The new furnace will be 65 feet, and 16 feet at the bosh.

Charles M. Wheatly's Copper Works, at Phenixville, is proving successful in the manufacture of copper. The ore from which it is melted is the product of Pennsylvania, and the works have a capacity of 25,000 pounds of ingot copper per month, of a quality claimed to equal the best brands of Lake copper.

William Steven's Tool Manufactory, at Philadelphia, is actively employed in the production of stone cutters' tools, mill picks, &c. He is the successor to Joel Lane, who formerly carried on the business. Mr. Stevens makes a specialty of the above class of tools, which bear an excellent reputation.

Work has been resumed at the Presque Isle Iron Works, Erie.

Waterman & Beaver's Rolling Mill, at Danville, is again in operation.

A large pair of chilled rolls were recently shipped to Belgium by A. Garrison & Co., Pittsburgh, to be used by a manufactory in that country.

The Bethlehem Iron Company have resumed work in all their mills, with the exception of the one devoted to steel manufacture.

MASSACHUSETTS.

The annealing house of the Plymouth River Works, at Plymouth, was burned Feb. 9, involving the company in a loss of \$3000; insurance, \$1300.

MAINE.

The rifle factory at Mechanic Falls will soon be in active operation. The machinery is being manufactured, and the works are making rapid progress toward completion. This new enterprise is under the management of the Evans Rifle Manufacturing Company.

RHODE ISLAND.

The Providence Brass Foundry, of which Mr. A. H. Manchester, is proprietor, has been in existence over a quarter of a century. At the works various kinds of machinery, railroad and ship castings are manufactured, a specialty being made of calendar rolls and paper mill works. The foundry is thirty-two feet square, and gives employment to six hands. The shop is used for making rolls 40x40 feet. A reverberatory furnace is used. The machinery includes five lathes, boring machines, drilling machines, &c. The rolls are sold to blancheries and paper mills in all parts of the country. Mr. Manchester also makes copper single plates, weighing from 500 to 1000 pounds each, for singeing cloth. A four-horse engine furnishes the power.

ILLINOIS.

The rail mill belonging to the Springfield Iron Co. was started up double turn on Wednesday, the 11th inst., on an order for 52 lb. rails. By the afternoon of the 14th 508 tons were finished. The amount would have been considerably larger had the rails been of heavier section, but we think it shows a very good capacity for a new mill. All the heating and a part of the puddling is done in Siemens' gas furnaces, and the quality of iron produced is entirely satisfactory to the company. The furnaces are also said to be very economical in their operation.

The works of Boomer, Jenks & Casper, at Chicago, are devoted to the manufacture of galvanized iron cornices. The company turn out about \$75,000 worth of goods annually, and employ some forty workmen. Robert Griffiths, in the same line, manufactures over \$100,000 worth of goods, and employs sixty hands.

Business is brisk at the Zinc Roofing and Ornamental Works at Chicago. This concern employs fifty workmen, and turns out annually about \$800,000 worth of manufactures.

OHIO.

The Marietta Iron Company is the name of the new concern which succeeds the Marietta Iron Works Company, at Marietta. The new company is composed of gentlemen of wealth, and the capital has been considerably increased. The rolling mill, which has been closed for some time, will soon be started up again.

The plate mill of the Gaylord Rolling Mill went to work last week Mr. Stone taking his

old place. The guide mills, sheet mill and bar mill are still idle, and only about 60 men are now out of employment.

The Alliance Rolling Mills, at Cleveland, were burned February 5. Loss, \$40,000.

The Falls Wire Works, of Akron, employs 25 men and turns out a ton of wire daily.

The Connellsville Coke Trade.

Frank Coran's Paper gives the "state of the case" relative to the recent advance in the tariff for coke by the Pennsylvania Central and the Pittsburgh, Washington and Baltimore companies, as follows.

The Pennsylvania Railroad refuses to receive at Brinton any coke shipped at Broadford, and points east of Broadford, on the Mt. Pleasant Branch. This is to force the trade over the Southwest Pennsylvania Railroad, via Everson, from which point to Pittsburgh the rate has been raised from \$10.80 to \$13.80—an advance of half a cent per bushel, and ruinous to business, for it annihilates the margin of the Pittsburgh middleman who has taken any contracts at six cents per bushel on the wall. This action of the Pennsylvania Railroad, moreover, is said to be not only to secure freightage over the Southwest Pennsylvania Railroad, but also to foster the manufacture of coke on that happy road which vaguely hopes to be able to supply the whole demand for coke if properly encouraged. Then to block this little game of the Pennsylvania Railroad, the Pittsburgh, Washington and Baltimore Road—the general freight agent's published flat denial to the contrary—raise the rates on the Mt. Pleasant branch to Everson from \$4.28 to \$4.50—an advance of twenty-two cents, and an advance which, when added to the Pennsylvania Railroad's \$13.80, puts it beyond the power of any manufacturer on the branch to compete with those on the main line near Pittsburgh, or those on the Southwest Pennsylvania Railroad. The consequence is, the shipping of coke from the Mt. Pleasant branch works has entirely ceased, the works are running forty-eight and seventy-two hour coke, and the yards are rapidly being blocked up with the increasing stock; thousands of laborers are threatened with a total suspension of work, and a general gloom and depression prevails.

How long this unhappy state of affairs will continue is not known, but it is surmised it will be of short duration. The Pittsburgh, Washington and Baltimore road is anxious to go back to the old rates in vogue before February the 1st, is anxious to encourage the trade, and will, rather than grievously hinder it by its deadlock with its rival, carry coke at six dollars per car from the coke regions to the depot at Pittsburgh, whence, in wagons, it will pay to cart it across the city for re-shipment on Western roads. The road that can reduce the fare from Pittsburgh to Washington to four dollars, can reduce the rates on coke from the Mt. Pleasant Branch to Pittsburgh to at least a figure that will pay the manufacturer and the shipper.

A New Plate Glass Enterprise in Missouri.

At Crystal City, Missouri, which is situated about thirty miles south of St. Louis on the Mississippi River, an establishment of plate glass has recently been erected. The buildings are situated on the west bank of Platin Creek, and owned by the American Plate Glass Co. The bluff near which they are situated is described as a vast mine of white saccharoid sand of unsurpassed excellence and inexhaustible quantity. The analytical tests of the sand give the following approximate results: Silica, 99.62; iron, .09; magnesia, .11; lime, .07; total, 99.89. This indicates an unusual proportion of silica. Overlaying this body of glass sand is a cap of pure limestone, layer upon layer of white, blue and gray stone, and including a vast supply of the best fluxing for the manufacture of plate glass in the world. There are coal fields in the immediate neighborhood, and almost all the necessary materials for the manufacture of plate glass are within easy reach.

The American Plate Glass Co. was organized in 1872, with a capital stock of \$250,000, which has been increased recently to \$500,000. They began operations about a year and a half ago, and have already erected buildings consisting of a finishing hall 742 feet in length by 120 feet in width; a pot house, 40 by 100 feet; a clay shed, 48 by 96 feet; a furnace room, 50 by 114 feet; a plate house, 144 by 246 feet; an emery house, 40 by 118 feet; two boiler houses, each 38 by 40 feet and a blacksmith's shop 30 by 50 feet, beside a number of other buildings that are in course of construction.

Some idea of the works can be formed from the fact that if we conceive the buildings already finished in a line, we shall have not less than a quarter of a mile of continuous brick buildings. When in full working order the company expect to turn out 30,000 feet of polished glass each week. They are very sanguine of success, and from the circumstance that all the necessary materials are lying close at hand, and can be obtained at very low prices, there is every prospect of their hopes being realized.

A despatch from Pittsburgh records the occurrence of a frightful accident at the steel works of the Cambria Iron Company, Johnstown, Pa., on the 11th inst., by which three persons were fatally injured and thirteen others more or less seriously burned. A large ladle, containing five tons of molten steel, was overturned and showered the hot metal over sixteen men. Mr. Willoughby, the foreman, was among those injured. Some of the men had the clothing all burned from their bodies, even to their shoes. The company will look after the comfort of the men until they recover.

Warwick & Co.'s Foundry Burned.

A few days ago the foundry of Messrs. Warwick & Co., of Pittsburgh, was destroyed by fire. Before the firemen reached the ground the entire building was enveloped in a mass of flames that defied the most strenuous exertions. In less than an hour the structure was a mass of ruins. The loss is estimated at \$12,000, on which there is a partial insurance. The origin of the fire is unknown, but it is a curious fact that it started very near the spot where the great fire of 1845 was first discovered.

DEMAREST, JOYCE & CO.,
Iron Founders,
MACHINISTS,
and Manufacturers of
Sewing Machines,
Steam Fittings,
AND
LIGHT WORK of all kinds.
ALSO
Plain and Ornamental
Japanning.
20 to 30 Morton, and 57 to 65
Clymer Streets,
BROOKLYN, E. D., N. Y.

EAGLE IRON FOUNDRY.

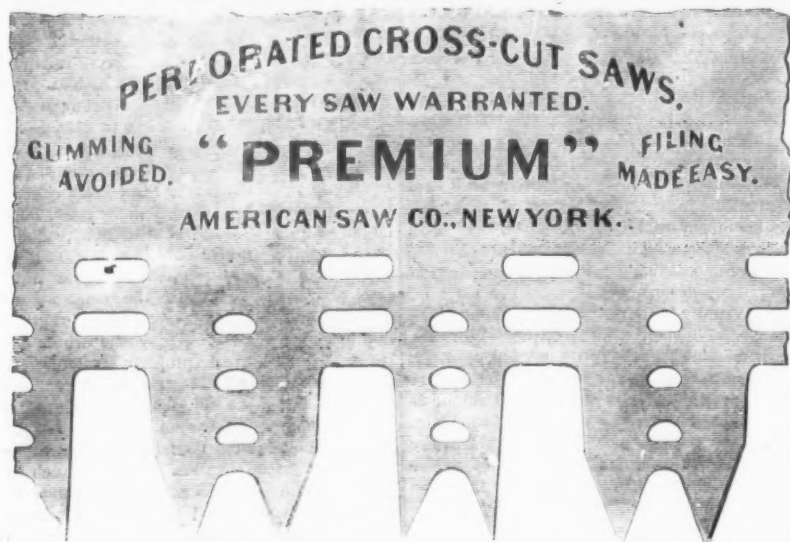
H. W. PEACE,

MANUFACTURER OF

SAWS OF ALL KINDS.

FACTORY, WILLIAMSBURG, N. Y.

AMERICAN SAW CO.,
No. 1 FERRY STREET, NEW YORK.

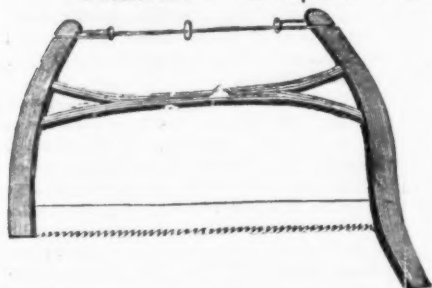


Solid saws require frequent gumming, thereby subjecting them to risk of springing or breaking. This especially the case with cross cuts having Patent Teeth. In the perforated saws all gumming is avoided, and the teeth are easily kept long and in proper shape, saving time, labor, expense and vexation. As is well known, our saws cut faster, smoother and easier than any other.

MOVABLE-TOOTHED CIRCULAR SAWS AND SOLID SAWS OF ALL KINDS.

Hankins' Elliptic Forked Saw Frame.

Patented June 28th, 1870.



The enclosed engraving represents HANKINS' ELLIPTIC FORKED SAW FRAME, which commands itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any centre bolt, secures for the frame great strength and durability.

These frames are put up with my best Webbs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE
VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

J. FLINT & CO.

Manufacturers of all kinds of **SAWS AND PLASTERING TROWELS.**
ROCHESTER, N. Y.

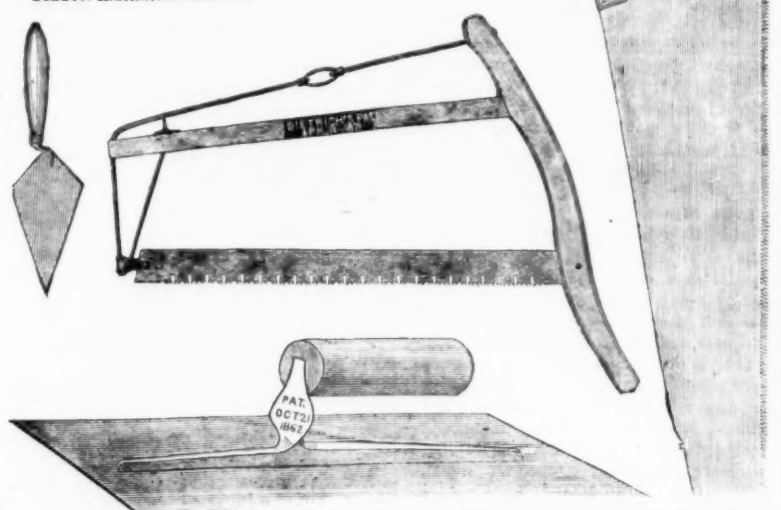
Dietrich's Patent Wood Saw. Guaranteed the strongest, lightest, easiest to strain or tighten and best braced wood saw made; also to give perfect satisfaction.

Dietrich's Patent Double Handle Rip Saw. All will readily see the benefit of this useful invention.

J. Flint's Patent Plastering Trowels. The best in use and finished trowels in the world. We make four grades of Plastering Trowels, from the best to the cheapest.

Our patent method of grinding hand saws makes them superior to any in the market.

Send for Illustrated Price List.



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Bed Screws, Pin Hinges, and Wire Nails a Specialty.

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Saw Manufacturers.

Best Cast Steel Patent Ground Saws
Also, sole Manufacturers of Atkins' Patent



CROSS-CUT SAW HANDLE.
Best Patent Handle in use.
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Designer & Engraver
on Wood.

21 Spruce Street, NEW YORK.



Putnam's Government Standard
FORGED

HORSE SHOE NAILS.

Manufactured from the best of NORWAY Iron,
and warranted to give entire satisfaction.

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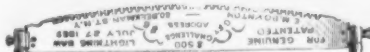
NEPONSET, MASS.

E. M. BOYNTON,

80 Beekman St., N. Y.

Manufacturer of

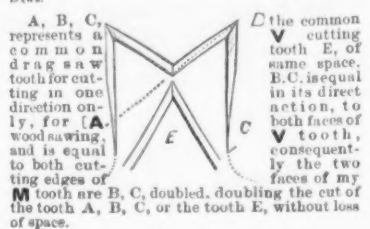
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A Challenge of \$500, toward expense of a public test to prove that the Lightning Saw, excels all others in Speed, Ease, and Simplicity, has been offered since 1870, and has never been accepted. More than 100,000 Lightning Saws were sold during the year 1872, the purchasers of which testify to their superior merits.

Our leading papers, such as the *Tribune*, *American Agriculturist*, *Christian Union*, etc., have published over sixty editorial notices recommending these Saws. Farmer's Clubs, Lumbermen, and Hardware Dealers unite in procuring the genuine Lightning Saw the greatest labor-saving implement of the age.

I have hundreds of letters from practical sawyers, voluntarily written, expressing their entire approval of these Saws.



This is produced by dressing the two points of my M tooth, to cut in line so that the outside B, C, has four times the space of the slant edge behind it, or from 1 to 5, while slant has space from 1 to 2. The inefficient slant edge is thus practically concealed and do but slight surface cutting, while B, C, edges cut and clear simultaneously.

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E. M. BOYNTON, 80 Beekman Street, New York,
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N. Y. Saw Frame Co.

E. M. BOYNTON,

80 Beekman Street, New York.

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I make a specialty of the **LARGEST SIZES OF Circular Saws**, and call particular attention of lumber manufacturers to the following points of excellence: **Evenness of Temper.**—The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed **BALANCES PERFECTLY**, which is a proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time **RUN TRUE**. This department is under the personal supervision of myself, who have devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "**Challenge**" (Cross-Cut) Saws. Price Lists of all kinds of saws sent on application.

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Cupola Brick, for McKenzie Patent,
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For Rolling Mills, Blast Furnaces, Foundries
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Equal to any in the market, and all guaranteed.
Keep in a full stock of all sizes on hand, and being confident of giving entire satisfaction we respectfully ask consumers to give us a trial.

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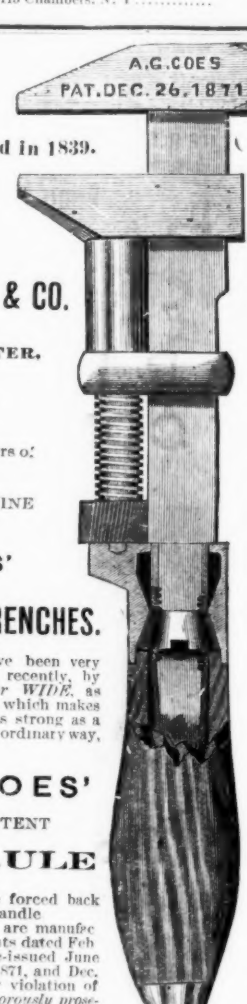
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Premium Awarded by the N. J. State Fair,
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 Premium Awarded by the N. J. State Fair,
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29, 1871), May 2, 1871, and 1871, and any violation either will be *vigorously* ne

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1 1/2 in. No. 24
1 1/4 in. No. 20
1 in. No. 18
3/4 in. No. 16
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5/8 in. No. 12
1/2 in. No. 10
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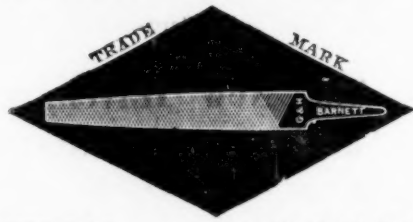
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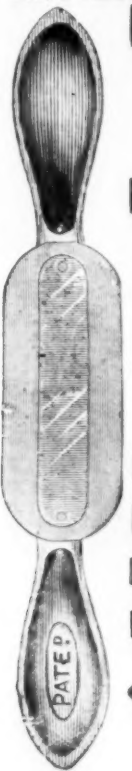
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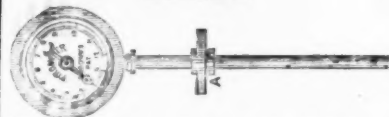
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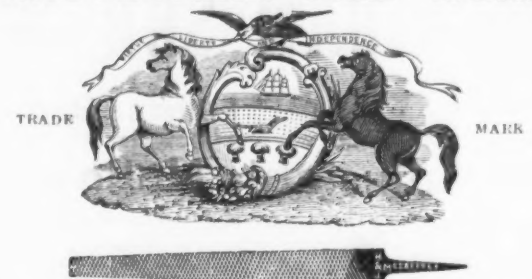
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MANUFACTURERS OF AMERICAN HARDWARE.

Cox & Tait's Pat. Wrenches. Mouse Traps. Wire Selves. Yaw's Cow Bells.
Axe, Pick, Sledge & Hammer. Scale Beams. Axes, Picks and Hatchets.
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Hatchet, Auger, Chisel & File. Tool Chests. Sad Irons.
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Having traveled for the last three years for a patented article, and been in the central part of New Jersey, would like to sell a line of goods either on salary or commission. Carriage or Light Hardware preferred. Address,

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**BOILER PLATE IRON,
Locomotive Tank Iron,
FIRE BOX IRON,**

And plates of every character and variety, and of all the higher grades of iron, from one-half inch thick to No. 18 W. G., rolled to specification.

Also, High Grades Bar Iron

Of refined and double refined qualities, and of all sizes, rolled to order.

Having a productive capacity of 30,000 tons per annum, we are prepared to take large specifications promptly, while our iron, being neutral in character and uniform in their working qualities, need but a trial to ensure their continued use.

Roller Railroad Axles a specialty.
Consumers' Direct Trade solicited.

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Catasauqua, Pa.

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By a Manufacturing Company located in Connecticut, within 40 miles of New York. He should be experienced in general machine shop practice, a fair draughtsman, and, above all, a competent manager of men and works. A person of good education, somewhat acquainted with office work, is greatly preferred. Present salary from \$1800 to \$2400, according to ability. Position permanent if satisfactorily filled. Address, stating past experience, references, etc., "T. R. H." office of *The Iron Age*, New York.

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A young or middle aged active and energetic partner, with twenty to forty thousand dollars capital, in an old established and well paying wholesale business in a healthy Western city. Best of references given and required. Address, B.,

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We have the machinery for a bar mill, which we wish to put in operation at Lockville, Chatham county, North Carolina. Lockville is on the Raleigh and Augusta Air Line Railroad and the Deep River, ten miles below the Egypt Bituminous Coal Fields. The climate is mild and the location desirable. A mill at that place would command all the local trade of the State. A person or persons having a knowledge of the business, and capital sufficient to work it, wanted to take an interest. Inquire of

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NEW ENGLAND

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Containing a complete list of the Manufacturers, Importers, Commission Merchants, Wholesale and Retail Dealers in all the Base Metals, and goods manufactured from them, in the New England States.

We are preparing and shall publish in April a revised and complete Directory of the Iron, Steel, Hardware, Machinery Manufacturers and Dealers in the New England States. To meet the want long felt by the Hardware Trade and Purchasing Agents, we are induced to publish a pocket edition to be used as a reference and guide for the Manufacturer and Dealer in Iron, Metals, and Hardware.

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Map of the Mineral Resources of
Chattanooga, Tennessee,
and Vicinity.

Compiled from surveys made with a special view of showing the location and boundaries of the three different kinds of Iron Ores and Coal Measures lying within a radius of about one hundred and twenty-five miles of Chattanooga. It also shows the different Railroads and Navigable Rivers and principal towns within this district, and routes to Washington, New York, Louisville, St. Louis, Cincinnati, Memphis, New Orleans, Mobile, and principal ports on the Atlantic Coast. This map is not published in the interests of any individuals nor landed proprietors, but with the view of showing to parties who may be interested in the manufacture of iron a section of country containing three different kinds of iron ores (which are shown in different colors), as well as coal in the greatest abundance, and their relative positions to each other. The map is gotten up by the publisher after an intimate knowledge of the country for twelve years, the last year of which he has employed two competent engineers in making special surveys, with a view of making the map as accurate as possible. It is about 27 inches by 36 inches in size, upon a scale of 15 miles to one inch, and printed on firm linen paper and put up in cases. It will be sold by subscription only, at the price of five dollars, and will be ready for delivery about the 15th of January next. Subscriptions can be made to the publisher, S. B. LOWE, Chattanooga, Tennessee, to the *American Manufacturer*, Pittsburgh, Pa., or to H. B. NEWHALL, No. 11 Warren St., New York.

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Translations and Condensations.

The undersigned, commercial Editor of *El Cronista*, the Spanish Government paper in this city, and Foreign Editor and Translator of the *Daily Bulletin*, has made it a specialty for years past to translate industrial matter with the strictest adherence to the technical wording from and into English, German, Spanish and French, for manufacturers, patentees and others, and begs to be recommended to the Iron masters and trade in that capacity.

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A MACHINIST, MECHANICAL ENGINEER and Draughtsman, a fair Mathematician, a foreman and engineer, and who understands mine surveying and book keeping, desires a situation in any healthy locality. Unexceptionable references. Address
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IRON & RAILWAY CO.

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ANTHRACITE PIG IRON

FOR FORGE AND FOUNDRY USE.

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42, PINE ST., N. Y.

Co-Partnership Notice.

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MALIN BROTHERS,

Iron Commission Merchants,

No. 228 Dock Street.

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Parties owning a large and very superior Furnace, 8 miles from Cincinnati, and an unlimited supply of the best Iron Ore, adjoining it, with abundance of timber for making Charcoal, wish to enter into arrangements with men of experience and means to run the Furnace for a term of years, under arrangements to be agreed upon. There is no place in the United States where Charcoal Iron can be made at as low a cost, or where transportation to market will cost less. Apply to

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FOR SALE, VERY LOW.

The old "Green River Works" of

J. Russell & Co., near the depot at Greenfield, Mass.

The cutlery business having been removed to Turners Falls, the Works near Greenfield depot, with all appurtenances, and about 100 horse power, will be sold low and on very favorable terms. The Works, which are on both sides of Green River, consist of Stone, Brick and Wood Factory Buildings, and were used for many years in the manufacture of cutlery; but they are well adapted to any manufacturing business. The property is so situated that it can be divided, if desired, into two almost equal portions.

In view of the nearness of the property to the new Hoosac Tunnel Railroad Line and the beautiful town of Greenfield, it must greatly increase in value. Here is a rare chance. Who will secure it?

Address or call on **D. C. G. FIELD,**

Treasurer John Russell Cutlery Co.,

Turners Falls, Mass.

IRON FOUNDRY FOR SALE.

Any person wishing to engage in the foundry business may learn of an opportunity to purchase a new building just erected for said business, all complete and ready to be started without delay or additional expense; or said property would be exchanged for unencumbered productive Real Estate. For further particulars address

H. F. A., Box 488, Northampton, Mass.

HARDWARE.

An old established business For Sale in the thriving city of South Bend, Ind. Stock will invoice about \$12,000. Trade large. An investigation invited. Reason for selling, ill health. Address,

"HARDWARE," P. O. Box 1364.

South Bend, Ind.

SAFE INVESTMENT.

For Sale,

Big Muddy Coal, Timber & Farm

Lands.

The whole or an interest in 7665 Acres of the Big Muddy Smelting Coal Lands, in Jackson County, Illinois. Vein 3 and 6 feet in 80 feet from surface; five improved Farms, with 246 acres under fence; Timber, such as White and Burr Oak, Walnut, Poplar, Ash; being 500 acres. The Timber alone will pay for the land. The St. Louis and Cairo Railroad runs through said lands, two miles from Murphysboro, the county seat of Jackson County, Ill. Will sell the whole for \$75 per acre, and take half or one-third interest. Address

DORSCHUTZ & ABEND,

Owners of three Mines in St. Clair Co., Illinois.

Belleville, St. Clair Co., Ills.

FOR SALE.

Or to lease on liberal terms to Manufacturers, building sites and water fronts on the property of Stearns & Sons, comprising 400 acres of land, with 4000 feet of water front on the East River, situated in Astoria, opposite 130th street, New York, and presenting unsurpassed facilities to the Iron Trade.

The Saw Mill, Iron Foundry and Machine Shops of Stearns & Sons have been erected on the ground, and are in full operation, and their entire Plant and Machinery will be removed to the premises.

For further particular address or call on

STEINWAY & SONS,

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For Sale.

Valuable Iron Mill
FOR SALE,

AT

ROME, GEORGIA.

Pursuant to a decree in Chancery, in Floyd Superior Court, the undersigned have been appointed Commissioners to receive sealed proposals until the 1st day of May next, for that valuable property in the city of Rome, in said State and county, known as the **ROME IRON WORKS**, more particularly described as follows:

The property of the Rome Iron Manufacturing Company consists of the Rolling Mill Building 300 x 140 feet, well finished and substantially built, with heavy truss roof. A train of 18 inch Puddle and Bar Rolls, and 9 inch Guide Mill. Two Horizontal Engines of 130 Horse-power each, to drive Rolls; two (2) heavy Steam Shears; Rolls and Saw for making light T Rail; twenty Nail Machines and one Spike Machine—also one Railroad Spike Machine—all with counter shafting and belting complete to run the same. One Beam Engine of 120 Horse-power to run Nail and Spike Machines; one 72 inch Demphill Fan-Rock and Ore Crusher; Furnace for heating Nail Plates and six large Grind and Bead Stones substantially set on Iron Frames; three Heating Furnaces; three Puddling Furnaces (two double and one single); one 30 ton Track Scale, with side track in the mill; twelve Cylinder Boilers, 30 feet long, and a Battery of 2 flue Boilers, 42 inches diameter, 30 feet long; two 16 inch flues supply the steam power. The Cylinder Boilers being placed over the Heating and Puddling Furnaces use the waste heat from the furnaces for generating steam. Also one Pumping Engine and Wrought Iron Tank for supplying the mill with water.

The whole mill is most complete in its arrangements for receiving and manufacturing and shipping materials, being probably one of the best arranged mills in the States. The Mill is in excellent order, and in full operation possesses unlimited facilities for getting Coal and Pig and Scrap Iron cheaply, and has a cash market for its entire products. It has a

Capacity of 125 Kegs of Nails per day.

" 3 Tons of Spikes per day.

" 12 Tons Bar Iron per day.

Pig Iron can be purchased for \$30.00 per ton; Wrought Scrap for \$5.00 to \$6.00. A force of skilled Workmen—old hands—are operating the Mill.

We solicit bids for this property and invite capitalists to come and make personal inspection of the same. All correspondence will be carefully and fully answered. We refer by permission to Noble Brothers & Co., whose Foundry and Machine Works are contiguous to the property described.

CHAS. H. SMITH,
T. W. ALEXANDER,
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For Sale, or to lease with privilege to buy: consisting of Foundry, Machine Shop, with powerful steam engines, and other buildings. Water front on North River, Peekskill, 48 miles from New York, comprising 2 1/2 acres. Apply for particulars, to

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FOR SALE, VERY LOW.

The old "Green River Works" of

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DORSCHUTZ & ABEND,

Owners of three Mines in St. Clair Co., Illinois.

Belleville, St. Clair Co., Ills.

For Sale, &c.

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The undersigned offer For Sale, to close a trust, the foundry property owned and lately occupied by Silas Merchant, in the city of Cleveland, O. One parcel of land is 500 feet on the west line of Alabama street, by 233 1/2 feet deep, with tracks of L. S. and M. S. R. R. on the north, and C. and P. R. R. on the south. Another parcel is 155 feet on the east line of Alabama street, and 625 feet on the north line of Lake street. On the premises are the necessary buildings, machinery, and all other appliances requisite for the economical manufacture of Water Pipe, Gas Pipe, Car Wheels, and Miscellaneous Castings, the whole being in perfect order, ready for immediate use, and believed to be the most complete establishment of the kind in this country. For price and terms (which will be liberal) Apply to

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N. W. CUTLER and
SILAS MERCHANT.
CLEVELAND Ohio, Feb. 14, 1874.

\$14,000

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10 Warren St., N. Y.

The Iron Age.

New York, Thursday, February 19, 1874.

DAVID WILLIAMS, . . . Publisher and Proprietor.
JAMES C. BAYLES, . . . Editor.
JOHN S. KING, . . . Business Manager.

The Iron Age is published every Thursday morning, at No. 10 Warren Street, New York, on the following terms:

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Weekly Edition. . . . \$4 a year.
Issued every THURSDAY Morning. Contains full Trade Reports for the week, brought up to the close of business on the previous day.
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One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$25.00; one year, \$40.00; payable in advance. All communications should be addressed to
DAVID WILLIAMS, Publisher,
10 Warren St., New York.

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CHARLES CHURCHILL & Co., American Merchants, 24 Wilson Street, Finsbury, London, England, will receive subscriptions (all postage prepaid by us) at the following prices in sterling: Great Britain and France, 25s; Germany, Prussia and Belgium, 30s; Sweden, 50s. They will also accept orders for advertisements, for which they will give prices on application.

City Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

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Thirty-first Page.—Chicago, Boston, and St. Louis Hardware and Metal Prices.

Are We on the Eve of a Mechanical Revolution.

The many and important discoveries and improvements made during the past few years in the generation and utilization of power, has created in the public mind a vague idea that, possibly, we are on the verge of a mechanical revolution, and that before long electricity, magnetism, tide power or something else will perform, at a nominal cost, the varied functions of steam as a motive power. The existence of this idea is, doubtless, due in a great degree to the manner in which certain unimportant and, generally speaking, unsuccessful experiments have been hailed by the newspapers of this and other countries as discoveries which must soon create a mechanical revolution; and the fact that these glorious predictions are never realized does not seem to have suggested a doubt that they ever will be. Few persons who have much knowledge of mechanical engineering, either theoretical or practical, look for an immediate solution of the problem of "power from nothing, or next to nothing," which, like perpetual motion, has long been the dream of impractical inventors and theorists; but the number, even of these, who believe that a great discovery in mechanical engineering is about to be made, which will give us cheaper power than we now have, is great enough to call for a serious and thoughtful consideration of the question at the head of this article.

For the first twenty centuries of the world's history, men made but little progress in the utilization of nature's forces. What man accomplished was the work of his hands, supplemented in some instances by the strength of domestic animals, which

were employed to a limited extent in drawing loads, carrying burdens and, sometimes, in elevating water for purposes of irrigation. As the rule, however, the work of the world was performed by manual labor, and so ignorant were the most civilized nations of the use of power that the wind was regarded as a hindrance, rather than a help, to navigation, and ships were propelled by oars.

The next thousand years saw the power of wind applied to pumping water, and to the propulsion of ships. In the latter, however, it was only auxiliary to the oar. About the same time water wheels were employed in the extreme East, to drive pumps or other machines for raising water. But with the exception of a few corn mills and the rude wheels for raising water, the world's work, for nearly four thousand years, was performed by man's unaided strength, the rare exceptions being scarcely worth the notice. Indeed, in navigation, in which progress has always been rapid, it is less than a thousand years since the wind was first used for the propulsion of ships, unassisted by men at the oars. This step was probably much hastened by the Norsemen, whose stormy seas prevented a great reliance in human strength. All these steps were slow, and century after century passed with no perceptible change in the general state of the arts, as regards the utilization of the forces by which man was surrounded.

It is now only about two hundred years since civilization attained a point which rendered power a necessity. Men alone were not strong enough to do the world's work. Then began an interesting era of mechanical progress. The Dutch engineers did wonders with the windmill, and brought up its efficiency to a point that is hardly to be excelled at the present day. Smeaton attacked the wasteful water wheels, and succeeded in bringing their "duty" up to a remarkable figure. Mining industry called for pumps, for water must be raised or mining must be stopped, and cities must have water or they could not exist. Savary, the Marquis of Worcester, Papin, Newcomen, and many others, had in a rude way started the steam pump, and kept many a mine from bankruptcy by keeping the water down; and Smeaton and Watt almost simultaneously attacked the problem of raising water by steam power, the one as an engineer and the other as an inventor. Smeaton so greatly improved the atmospheric engine, or steam pump, as it is more properly termed, that it was for a long time a sturdy competitor with Watt's improved machine. Watt was, strictly speaking, the father of the Cornish steam pump, and nothing more. In the meantime there grew up in England and on the Continent, as well as in this country, a demand for cheap and convenient power, which was met in part by the invention of the high-pressure steam engine in this country, and the almost simultaneous application of the atmospheric engine to produce a rotary motion. Before it had been necessary to take the manufactory to the waterfall; now the power could be created where it was needed.

With these improvements, made less than a century ago, began a new era of civilization, characterized by a rapid industrial progress and commercial development. Production increased in a ratio more than proportionate to the decrease in the labor expended in producing, knowledge spread with the extension of better facilities for intercommunication, new wants were experienced only to be satisfied by new products, the luxuries of the past became the necessities of the present, and the enjoyments of life were increased an hundred fold. This progress was the result of a brilliant series of experiments and discoveries, which led gradually nearer to the maximum of economy in production, and for a long time it seemed as if that maximum would not be reached until production was so cheap that universal abundance would prevail, and life become a round of pleasure. The reflection of this indefinite idea of what was coming, when the possibilities of mechanical engineering were exhausted, is seen in the books and plays written during the past half century, in which the civilization of the future is foreshadowed in caricature. But we are suddenly confronted by the fact that we are nearer the maximum of economy than we thought, and that it is possible to reduce the present cost of manufacturing by a very small margin only, before we shall have reached the point when economy will cease and the cost begin to increase again. We find that it is often cheaper to waste a little than to render waste impossible, and that it would cost more than we should gain to save the percentage of power which is now wasted. This is true of both steam and water power, and henceforth our progress must be slow unless new elements are introduced. We can now make boilers that will evaporate as much as 10 lbs. of water to the pound of coal consumed under them.

When it is attempted to produce a greater economy than this, the interest upon the increased cost of the boiler amounts to more than the value of the coal saved. The consumption of the very best engines now manufactured reaches two pounds of coal per horse power per hour, while three pounds would be a more common figure with even the finest engines in the market. It might not be far out of the way to say that the general average would not be below six pounds of coal per horse-power per hour. Estimating the cost of a hundred horse-power per year produced by the consumption of three pounds coal per hour, as stated above, we should have a consumption of 450 tons of coal, worth say \$2250. Labor would amount to at least \$1400, while interest, including a sinking fund with which to replace the machinery when worn out, would amount to \$1000, which makes a total of some \$4650 as the cost of 100 horse-power for 10 hours per day during 300 working days, or one year. Except in the rarest cases, where there are exceptional engines of large power, it is not probable that the power costs as little as we have estimated, while in most instances, where small engines are used, the rate would be very much exceeded.

That much will be gained, in the way of cheapening production, from the gradual introduction of new and economical engines to replace those now in use, and which must wear out sooner or later, is evident. Manufacturers have discovered the benefit of using the best engines, and are disposed to look with more care after their coal consumption than they formerly considered necessary. But when the average duty of steam engines shall approximate that of the best now in use, the maximum of economy will have been reached, so far as steam is concerned. Where dams and sluice ways are already constructed, and the quantity of water is practically unlimited, a horse-power can be obtained for about half what it would cost if produced by a steam engine—at least it can be rented for that, to which must be added the cost of putting in a wheel, the interest on the same, and the wear and tear. With steam, however, the figures given are near the point below which no possible reduction can be made. The famous Perkins engines already utilize about seventy-five per cent. of the theoretical power of coal. Here, then, we have a standpoint from which to judge past, present and future progress. In economy, the progress of the last 50 years has been from the production of one horse-power with five or six pounds of coal per hour, to the production of the same power with one pound per hour. Beyond this we can make but little progress, unless it be in some new and hitherto unknown direction. It is, of course, impossible to say what new discoveries may be made, but with our present knowledge of nature's laws, we are justified in believing that we are not on the eve of a mechanical revolution, and that hereafter it will be impossible to cheapen steam power materially, unless we can reduce the cost of coal by devising cheaper methods of mining and transporting it.

That there will be a rapid and sustained industrial progress during the next century is probable, but it will be a progress in the direction of economy in little things. Chemistry is showing us how to utilize our former waste products, inventive talent is constantly employed in devising means of economizing labor, and the arts and sciences are all contributing to progress in numberless ways; but no discovery has yet been made which affords a basis for a reasonable hope that we shall have motive power at a cost very much below the cheapest price at which it is now obtainable.

The National Association of Stove Manufacturers.

Elsewhere in this issue will be found a very full report of the meetings of the National Association of Stove Manufacturers in Albany, on Wednesday and Thursday last. As will be seen from our report, the association decided that the price of stoves for the ensuing year could not be reduced more than ten dollars per ton from the minimum scale adopted at the Pittsburgh meeting in February 1873. This scale was as follows:

Common Stoves	10c.
Medium Class Stoves	15c.
First Class Stoves	20c.
Old Plates	25c.

In the judgment of the Association, formed after much debate, the reduction of \$10 per ton is all that can safely be made at this time, without wiping out the founders' profits. The only reduction in the cost of making stoves is in the item of pig iron, and \$10 per ton gives the consumer all the advantage which cheaper iron would have given the manufacturer had prices been maintained on the Pittsburgh basis. The meeting was large and harmonious, and insures the permanence of the

association—a fact upon which the trade is to be congratulated.

Among the interesting features of the meeting was the reading of papers by Mr. G. F. Filley, on the comparative cost and profit of light and heavy stoves, and by Mr. Wm. Keep, on the causes of cracks in iron castings. The former of these valuable essays we give in this issue; the latter will be given as soon as the work of engraving the plates is completed.

The Centennial Report.

A report has been agreed upon by the Executive Committee of the Centennial Commission, which has been sent to Gen. Hawley, President of the Commission, now in Washington. It begins with the report made in February, 1873, by the Commission to the Senate and House of Representatives, and then gives an account of the work which has been done since, namely, the change of organization, making the Hon. Alfred T. Goshorn, of Ohio, the executive head, with the title of Director-General; the organization of a foreign department, presided over by Henry D. J. Pratt, formerly in the State Department at Washington, whose duty it is to open communication with foreign exhibitors; and the appointment of Henry Pettit, of the engineering service of the Pennsylvania Railroad, to take charge of the engineering department. The plans for the main pavilion or exhibition building by Vaux & Radford, of New York, together with those for the memorial building to be constructed by the city and State, by Collins & Autenreith, of Philadelphia, were also reported. A full account of the work done in the office since the last report is given, and in conclusion the report urges on Congress the necessity of taking immediate action on the measures that are intended to further the interests of the Commission.

The committee also passed resolutions in the nature of a memorial to the President of the United States, in which they say that everything that has been done has been effectually done, and they consider themselves now in advance, so far as preparation is concerned, of any exhibition that has ever been held. They conclude by saying that if Congress comes to their assistance immediately there will be no difficulty in making the Exhibition all that is promised by its most sanguine friends.

A Scientific Section of the Iron and Steel Association Proposed.

It is gratifying to learn that the officers of the American Iron and Steel Association realize the importance of doing something to promote scientific study and investigation among the ironmasters of the United States, and to create an American literature of metallurgy which shall reflect, correctly and completely, the rapid and sustained progress of our great metallurgical industries. To promote this progress by the investigation and discussion of subjects connected with the chemistry and metallurgy of iron and steel was one of the objects of the Association, but other work of more immediate importance has monopolized the attention of its members. It can no longer be neglected, however. The Iron and Steel Association is now the one representative association of American iron masters. It is strong in numbers, strong in wealth, and strong in influence, and upon it devolves the duty of stimulating progress by promoting scientific study and experiment, as well as the duty of guarding our iron and steel industries from the attacks of those who would sacrifice home industry in the interest of foreign trade. It has long been a source of mortification that we have, in this country, no scientific association organized for the discussion of subjects connected with the metallurgy of iron and steel. The American Institute of Mining Engineers has a large and influential membership from the iron trades, but it does not call out the full and free discussion that is so much needed, for the reason that its meetings are largely attended by representatives of other professions who feel no especial interest in iron, and whose contributions to its proceedings relate chiefly to mining and the precious metals. But notwithstanding the fact that it represents half a dozen or more distinct branches of mining and metal working, it has called out the best contributions which have been made to the current literature of iron metallurgy during the past two years—a fact which warrants the belief that an association composed wholly of those interested in the science and technology of iron manufacture would do much to awaken a new and active interest in a department of study and investigation which have been too generally neglected by American ironmasters.

The project now under favorable consideration in the Executive Committee of the American Iron and Steel Association is, we believe, to invite a number of gentlemen known to be deeply interested in iron metallurgy to organize a scientific section which, when organized, shall form a part of the association. It will be governed by its own by-laws, and will meet quarterly wherever the largest attendance can be secured, and where there are interesting iron works or mines to be visited. The section will be self-supporting, and its membership will be exempt from assessment for purposes connected with the work of the association proper. This, we understand, is the general plan upon which it is proposed to organize the Section, and it could not be better. By meeting in different parts of the country, a greater and more general interest will be created in the work of the Section than if it should meet regularly in New York or Philadelphia. The proceedings will be published in some permanent form, accessible in all the public libraries to students of metallurgy, and will be valuable additions to our limited American literature of iron and steel. To make the organization of the Section complete, it should have a Foreign Secretary to attend to duties similar to those so ably and intelligently performed by Mr. David Forbes, of the British Iron and Steel Institute, and standing committees to investigate and report upon all novelties, improvements and discoveries which may possess general interest and importance. With the addition of such a Section, the American Iron and Steel Association would stand without a rival among the greatest trade associations of the world, and its influence in promoting the progress of our iron and steel industries would be great and permanent. If we are rightly informed, the addition of a Scientific Section has been decided upon by the officers of the association, and we hope the work of organizing it will be undertaken without delay. We can promise the active co-operation of many gentlemen of high scientific attainments and national reputations, and we think there will be but little difficulty in securing a large and valuable membership in a short time. Certainly, such a society is needed in this country, and if organized under the auspices of the American Iron and Steel Association, it cannot fail to enjoy the fullest confidence of iron masters and metallurgists in all parts of the country.

The Proposed Railroad Tunnel from Dover to Calais.

For several years the proposition to build a tunnel under the twenty-six miles of sea that divides England from France at the nearest points, has been occasionally brought forward for discussion; and the surveys of French and English engineers have almost demonstrated the practicability of the project. But, hitherto, the financial prospects of the enterprise have been less encouraging than the probability of overcoming the engineering difficulties. The English and French engineers engaged to make surveys and report on the subject, put forward a plan in 1867, for the construction of a tunnel 34,400 metres long, connected to the network of railway on either side of the English Channel by underground galleries about 10,000 metres long. Applications were made to both the French and English governments for funds to enable the projectors to construct submarine sections on either side of the channel as an experiment, but the demand was not then favorably entertained, and the breaking out of the war between France and Germany put a stop to any further action at that time. Since then a company of English and French capitalists has been formed, who propose without government aid to complete the work, provided they get from both governments a perpetual guarantee against all competition. This guarantee the English government positively refuses to give, while the French government, before deciding on the subject, proposes to submit the scheme to such investigation as is usual for all public works.

It is very doubtful if the tunnel would pay, for, although the channel between Dover and Calais is proverbially rough, and more productive of sea sickness and its attendant discomforts than almost any other place on the face of the ocean, it is unlikely that any sufficient number of tourists or others could be induced to make the submarine journey at such rates as would enable the builders to pay a dividend for several centuries. If the two governments should undertake it as a grand international enterprise, it might succeed, but private capitalists cannot, as a rule, afford to wait so long for a return of interest on their investments.

The value of the importations at New York for the calendar year 1873, exclusive of specie, were \$46,000,000 less, and the exports \$64,000,000 more, than for the year 1872. The returns of imports for January of the current year show a continued tendency in the same direction. For January, 1874, they were \$30,310,679; for January, 1873, \$37,803,691. This comparison would be the more startling did we not remember that the importations for January, 1872, were the largest ever recorded for that month.

The Stove Founders' Convention.

The Semi-Annual Meeting at Albany.

The National Association of Stove Manufacturers assembled for its usual winter convention at Horticultural Hall, Albany, on Wednesday last. The attendance was unusually large, fully one hundred members being present, several of whom represented two or more foundries. It was in all respects a successful meeting, and its action insures the permanence of the association, and disappoints the expectations of all who looked for its disruption.

The meeting was called to order by Mr. Jno. S. Perry, of Albany, president, who proceeded to deliver an address of much interest and value.

ADDRESS OF MR. PERRY.

Gentlemen of the Association.—It is now two hundred and sixty-five years since, in the gray dawn of an autumn morning, a gang of red men stood at the foot of the hill on which this city is built, watching with curious eyes a Dutch galleon, propelled by huge sweeps, which was silently nearing the shore. * * * * *

Years rolled on. The red man smokes his pipe in the "happy hunting ground" of the Great Spirit. The screaming of the eagle in the mountain tops gives place to the voice of the dove in the belfry of the church. The name of Orange is succeeded by that of Albany. The wooden covering of the hill is usurped by the quaint gables and tiled roofs of the Hollander, and these in turn are supplanted by the legions of residences of modern times. But through all of these changes the hospitality which characterized the aboriginal inhabitants of our Dutch city has remained the same, and to-day, with open doors, we extend to you as hearty a greeting as was given two centuries and a half ago to Hendrick Hudson and his brave followers.

We have met here to-day to discuss in a friendly spirit the events of the past year, so far as they have had a bearing upon our business, and to discover, if it may be, that course for our future action which shall secure to us the greatest prosperity. To aid us in this attempt we must dismiss all sectional prejudices, and all those feelings which naturally arise from business strife and competition. We are, I trust, naturally inspired by mutual good will, as well as by a desire for the prosperity of every portion of our common country. We meet here upon even ground.

Neither by nature, custom or law, have any individuals or classes special claims upon the business of any particular territory. It is theirs only when obtained in a legitimate way, that is, open to the rest of the world. This perfect freedom in trade must be acknowledged and accepted as a fundamental principle, which no human power can change.

We must also frankly accept the fact that while our general interests are similar, if not identical, there is an antagonism between our special and personal interests which cannot be overcome. Starting thus upon this basis, which is laid on the very foundation of things, it becomes us, first, carefully to inquire what course of action shall permanently promote our own individual interests, as well as those of the whole trade; and, secondly, what uniform plan can be adopted and carried successfully into practice under existing circumstances.

I will submit for your consideration a few plain propositions:

1st. The primal object of manufacturing and selling stoves is:

a. To secure an honorable living; and
b. To produce such improved articles of utility or elegance as shall tend to promote civilization and human comfort.

2d. The occupations in which we spend the greater portions of our lives should be so conducted as to best promote our individual happiness, so far as that may be consistent with the rights of others.

3d. The cost of our products is, in the main, beyond our control, although it may be somewhat modified by circumstances or industry and skill.

4th. Whatever may be our views as to the details of this cost, the exact amount will be shown by the balance sheet at the end of the year.

5th. To realize the success so greatly desired and so justly our due, an ample margin of our prices above this cost must be secured, or ruin is only a question of time, even to the strongest.

And, sixthly, Such a disaster to any large manufacturing interests would be a public calamity, since, when each individual is reasonably prosperous, the whole community is benefited.

These propositions being admitted, our course of action would appear to be plain. But unfortunately another element exists which we cannot control, viz: the want of unity of thought and action in the trade at large. We have, during the past two years, made strenuous efforts to overcome this impediment, and although only partially successful, enough has been accomplished to give us encouragement for further exertions. During most of this time a body of men, forming three-quarters of the trade, have faithfully tried the experiment of association—have made a fair approach to a millennium and realized to some extent its blessings. We have thus experienced a prosperity and a satisfaction in conducting our business to which we had for some previous years been strangers, and which we shall not be likely to see repeated under any other system.

We have seen that under ordinary circumstances it is possible for 163 independent members of an important trade to act in harmony and substantially fulfill their mutual pledges, and thus, too, while the remaining 55 members of the same trade have not only refused to co-operate, but, in some cases at least, have availed themselves of the situation to obtain the temporary advantage which such a course seemed to promise.

If a large and prominent portion of the trade could thus act in harmony for mutual benefit, why could not the entire number appreciate the advantage of making the system a complete one? If the whole trade thus united had adopted such prices as would allow a fair, reasonable profit, and have maintained them, the system would have been rendered so attractive as to ensure its perpetuity. No injustice would have resulted to the public, but rather a benefit. Beside, we have a generous constituency to deal with. The bulk of our good articles are and are willing to pay for them such prices as will afford us a reasonable profit.

It must be admitted, however, that our organization, imperfect as it is, has been of great advantage not only to our own membership, but to those who have neither given us their influence nor aid. Our sales were generally satisfactory in amount, and the prices well maintained up to the time of the terrible revolution in September last. An exceptional state of things existed after that time, which could not have been foreseen. Iron fell rapidly in price, and the borrowing of money was impossible. Encouragements were pressing, and self-preservation compelled many to digress from their accustomed paths. Thus the prices of the more common qualities of stoves became somewhat unsettled toward the close of the year. But it

has been generally remarked that they were better maintained than might have been expected under the trying circumstances, and this was in a great measure due to the influence of the association. * * * * *

I think we shall all agree upon one point, viz: That the Association must be sustained. Great benefits have already resulted from our frequent meetings, not only in the discussion of matters in which we have a common interest, but also in our social and personal relations. Asperities have been softened, friendship and good feeling promoted, information of common interest has been disseminated, and movements for the general good made with a power which individual effort could not command. * * * * *

It has also been said that the trade of the West belongs to the Western manufacturers, and that the East has no right to seek for it. As well might it be said that the waters of the Hudson have no right to find the sea. They will, nevertheless, continue thus to flow as long as the face of the country remains unchanged. And so will the East continue to seek a market in the West, until driven out by better goods or lower prices. This is in accordance with an inviolable law of trade, nor can human power alter it. The situation must, therefore, be accepted. New England and Pennsylvania will come to New York, and the latter will return the compliment. The East will seek a market in the West, while the latter can repay it in the same coin. All this is beyond the province or the power of our association. If it be true, as alleged, that Eastern competition causes a serious injury to Western manufacturers, then so much the more do the latter need the protection of established prices. In the one case they have the competition with reasonable profits, and in the other with disastrous losses. Which, I ask, is the least of the two evils?

It is held by some that the association has injured the trade by bringing into existence and fostering new foundries until the trade is overdone. I am not prepared to say that the trade is not overdone, but I believe it to be true that there are a less number of stove manufacturers in business to-day than was reported at the time of our organization, and I question whether the number will be increased at present, though the annual product may be larger.

But, granting that there has been a moderate increase during the past two years, has not the progress of our country in wealth and population more than equaled it? The population in 1870, according to the census, was 38,555,983. With the same ratio of increase as during the last forty years, we shall have, in 1875, a population of 43,429,459, or about a million more families to be supplied with stoves than in 1870. But suppose this estimate shall not be reached, and the number shall only reach half a million, this will give us a total of 8,211,197 families, which sooner or later are to be supplied with stoves—number large enough to set at rest any idle fear with reference to the future.

It is estimated that our annual increase in wealth is not less than one thousand millions. The exact figures from 1850 to 1860 are \$897,092,000; from 1860 to 1870, \$1,373,601,000; and the average for the twenty years, \$1,135,347,000. Our annual industrial products, which include those of agriculture, manufactures and mining, were reported in 1870 at \$6,525,093,312. As the increase in manufactures during the previous decade was 108 per cent, the following will not be an unreasonable estimate for the next twenty-five years:

1880.....	\$ 9,525,000,000
1890.....	12,950,000,000
1900.....	17,000,000,000

In this proportion of increase we have at this time a total annual product of \$7,725,057,757. Bearing in mind these figures, let us consider for a moment the possibilities of our country when the density of our population shall be equal to that of Great Britain.

Instead of forty-three millions we shall number 825 millions, and in the same comparison with Belgium we shall reach the enormous figure of 1,333 millions. But, without looking into distant time, we have in the present and in the immediate future a sufficient population to allay any fears that may arise from a moderate increase in our production.

In view of the amount of our present industries and the estimated increase during the several decades named, I ask you to consider for a moment how illogical are the propositions of certain wise men that the volume of our circulation shall never be increased beyond seven hundred and fifty millions, and where I ask you, is the specie basis to be found in a volume of the year 1900 for paper circulation proportionate to seventeen billions of annual productions? A specie basis for our circulating medium in theory is superb—but in practice it is a fallacy. When the public do not want specie the banks pay it; but when they call for it, there is none to be had. It costs me \$1-12, if you please, to pay a foreign debt upon a dollar. With the present amount of circulation, I can better afford to pay \$1-50 in settlement of the debt than to have this volume reduced to a point compatible with specie payments.

At this particular time, when the country has but partially recovered from the paralyzing effect of a great financial crisis, it is not unlikely that the stocks of stoves on hand, and the facilities for production, may be in excess of the demand. The same, however, may be said of most other departments of industry. Those who hold large stocks will manufacture less than usual, and thus the supply and demand will become equalized by the operation of natural laws. Nor is it unlikely that the volume of business during the present year will be reduced. Such years are incident to all departments of business. But taking one year with another for five, ten, or twenty years, I see no reason to doubt that satisfactory returns will be realized if due regard is paid to the fundamental laws of trade.

The reports from the leading markets are uniformly to the effect that the business was satisfactory, both in amount and in prices, until the time of the panic. * * * * * But it is not true that all branches of trade have suffered from the whirlwind which engulfed so many strong houses into ruin? I venture to say that in no department, either of mechanical or commercial industry, has there been less suffering than in the one which we represent; we can confidently predict that in the work of recuperation it will be in the front rank.

The low prices at which common forge iron were quoted during the autumn and early winter, have given the public an impression that stoves will bear a very large reduction the coming season. Nothing can be further from the truth. The cost will be just \$10 per ton less than last year. This allows a reduction of \$1 upon a stove weighing 300 pounds. The minimum prices established a year ago were as follows: 7½¢, 8¢, and 9¢, with a reduction of half a cent per pound, which is the amount that we shall save the present year in the cost. The minimum prices should be 6½¢, 7½¢, and 8½¢. These prices must be maintained if we would have the results of 1874 equal to those of 1873. That even these latter figures were unsatisfactory in many cases, I am assured by some friends who make desirable stoves, and are supposed to obtain good prices for them.

A further reduction of \$10, or in all, \$20 per ton, might leave such firms with the balance on the wrong side. On a product of 3000 tons such a reduction from the net profits would be \$30,000. Are we prepared for this? Would not such a proportionate reduction from the profits of last year absorb every dollar which our

looks now show? This is a vital question, and should be deeply pondered before it is too late. * * * * *

In my estimate of cost of ordinary stoves, submitted in March, 1873, I showed the amount, with iron at \$40 per ton, to be.....\$120 00 From which deduct for present difference in iron..... 5 00

Showing the present cost to be.....\$115 00 Add \$20 per ton for profits..... 20 00 \$135 00

or 6½ cents per pound; and this is the rate which I think we should not only adopt, but also strive to maintain. It would be happy when our balance sheets are made out at the end of the year. Iron may now be fairly quoted at \$35. The future will depend upon supply and demand. Of the low grades of iron there is a surplus; but this is not the case with such qualities as are required for stove plates. At our last annual meeting, I placed the product of our furnaces for the year 1873 at 2,600,000 tons. Some estimates were made for three millions and over. The returns show the actual product of 2,406,637 tons, or a falling off from the previous year of 193,363 tons. The capacity of our furnaces, if all were run continuously, is placed at 4,371,277 tons, and, therefore, it would appear that any material advance in price would very soon create a surplus. Between 200 and 300 furnaces are now reported out of blast, waiting for favorable prospects to resume. It is stated in the last report made by the Pig Iron Association, that the cost in December, 1873, at the furnaces, was \$28.97. If this be a fair criterion for the present year, the profit at \$35 for No. 1, and considerably lower prices for Nos. 2 and 3, does not show a margin which admits of much reduction.

The stock of pig iron in the North of England and Scotland on the 31st December was 35,000 tons less than the previous year, and the average price of sixteen shipping brands—twenty-two shillings and sixpence greater. Coal is more abundant in Great Britain, and it is probable that the price of iron there will recede.

Our importations of iron and steel during 1873 were 52 per cent. less than the previous year, and it is believed they will be still less during the present year. The production of Great Britain has probably reached its maximum, while in this country our resources are so unlimited that we shall be less and less dependent yearly upon importations.

The movement of the world appears to be much the same as usual. The railway trains and the steamers run with their accustomed regularity, and without apparent diminution in frequency. All this represents the use of iron and its destruction. The increased receipts of over nine millions by twenty three prominent lines of railways in 1873 over that of the previous year indicates ability to purchase iron for repairs and for extensions. Railway building has received a temporary check, and instead of five or six thousand miles of annual construction, as heretofore, the increase for the time may not exceed half that amount. * * * * *

But whatever the present year may develop, I think we can safely depend upon a pretty uniform annual increase in the consumption of iron in its various forms. * * * * *

Your attention will be specially called to a proposed exhibition of stoves and furnaces at the Centennial in 1876. Mr. Bayles, the accomplished editor of *The Iron Age*, who is now present, has given this subject his attention, and during our proceedings remarks in relation to it.

I think this an appropriate time to introduce to the Association a subject that in many ways is intimately connected with the prosperity of our business. It is well known that in August last a Patent Congress was held in Vienna, of which Baron Von Schwartz-Sorn was the honorary president, its members comprising some of the best scientific, professional and practical men on both continents. Among other propositions enunciated was the following:

"The protection of inventions should be guaranteed by the laws of all civilized nations."

This sentiment was received with unanimity, and it is one that must command universal favor. A plan to secure, sooner or later, an approximately uniform system of patent laws among all civilized nations was favorably considered. Also, the general question of the rights of inventors and the modification of our own patent system, which is already so far in advance of all others that foreign nations are beginning to look upon it with favor.

The committee appointed at Vienna called a convention at the city of Washington on the 15th of January. It was largely attended by prominent men from all parts of the country, who freely discussed the various principles laid down by the congress at Vienna. An association of inventors and the modification of our own patent system, which is already so far in advance of all others that foreign nations are beginning to look upon it with favor. The committee appointed at Vienna called a convention at the city of Washington on the 15th of January. It was largely attended by prominent men from all parts of the country, who freely discussed the various principles laid down by the congress at Vienna. An association of inventors and the modification of our own patent system, which is already so far in advance of all others that foreign nations are beginning to look upon it with favor. The committee appointed at Vienna called a convention at the city of Washington on the 15th of January. It was largely attended by prominent men from all parts of the country, who freely discussed the various principles laid down by the congress at Vienna. An association of inventors and the modification of our own patent system, which is already so far in advance of all others that foreign nations are beginning to look upon it with favor.

If such mighty results have been produced in only two departments of activity, results that have revolutionized commercial and social life, what must be the sum of the debt we owe to the inventive genius of the world?

It is often said by the thoughtless persons that patents do not merit anything, and are granted to anybody that applies for them. The men who have had occasion to make such applications to the United States Commissioners can testify to the falsity of this charge, as well as to the painstaking care with which every application is scrutinized. That a large majority of the number of patents granted appear upon the surface to be spurious, is simply another mode of characterizing them as the results of human efforts. The lives of but few men can truly be pronounced successful, but each individual has his place in the world, and his part to perform, humble though it may be. He is one atom in the great whole, and deserves recompense in proportion to his merits. So it is with invention. Since the organization of our government, more than 150,000 patents have been granted. To the curious observer comparatively few of these have possessed any special value. But who shall presume to say which individual invention in that vast number has not had some direct or indirect influence in promoting the wonderful progress of our country during the present century? * * * * *

It is imagined by some that the patent system is a burden upon manufacturers. How can this be true? No one is compelled to use or manufacture a patented article. They will not do so unless it shall appear to be an improvement upon old processes either in economy or effectiveness, or in the production of something that is more valuable. In the use of such an article the manufacturer finds an economy beyond the cost of the right to such use. In the manufacture of patented articles for sale, an increased price is obtained which more than covers the price generally paid to the inventor. The public are satisfied to pay this. Therefore no burden is imposed upon the manufacturer. That inventors are public benefactors and inventors public blessings, which the world appreciates and accepts, is proved by the fact that a very large proportion—some estimate as high as nine-tenths—of the manufacturing industry of this country is based upon patented articles, either as implements used in the process or as the product of manufacture.

The perfecting of our own patent system will receive the special attention of this new association, not only for the protection of the inventor, but also for that of the public, for there are two parties to this question, and each have equal rights which must be respected. Whatever may be our opinions as to the wisdom and justice of patent protection we cannot doubt that objection of some kind will continue to exist, and it must therefore be the part of wisdom for us to unite in making it as free from imperfections as possible. I shall feel personally obliged for your co-operation and for your aid in giving success to the United States Patent Association.

Since we last met it has pleased Almighty God to remove from our number Mr. Wiley S. Wright, for five and twenty years a member of the respectable firm of Buck & Wright, of St. Louis, Missouri. He was a man of high character and excellent standing in the city where he so long resided, combining good business qualities with a sound judgment and an extended business experience. In the prime of life he was taken unexpectedly from his family and business associations. We are thus forcibly reminded of the uncertainty of life, and of the secondary importance of these worldly interests which now appear to us of so much importance. Such events should have the effect to modify our ambition, to allay strife and contention, and to emphasize the principles laid down in the golden rule, of "doing to others as we would have them do to us." We tender to the bereaved family our sympathy.

Before closing, I would remind you of our singular good fortune in holding our reunions in localities memorable in our country's history. Cincinnati, the pioneer in the settlement of the great West; Pittsburgh, the scene of the downfall of French supremacy in America; Niagara, which witnessed the battle of Chippewa and Lundy's Lane, and now Albany, the birthplace of one of the most illustrious generals in the American revolution. Is it, then, a matter for wonder that, surrounded by such associations, our meetings hitherto have been inspired by honorable intentions toward each other, and by a desire to render the interest that we represent one of the great sources of our national prosperity.

One more word. Standing here as I do in the home of the Schuylers, the Van Rensselaers, the Van Vechten, the Ten Broecks and other names of renown, I should be recreant to the traditions of their ancient and generous hospitality, did I not again extend to you a cordial welcome, congratulating ourselves that we have with us to-day guests whom it is a pleasure to entertain with honor. "The chief amusement of the Albanians in winter," says Mrs. Grant in her entertaining account of her visit here before the revolution, "is for young and old to ride down hill in the great street of the town." Circumstances are now peculiarly favorable for the enjoyment of this kind of recreation. But there are other ways in which we trust to make your stay agreeable. We shall endeavor to convince you that the kind hearted and unostentatious manner of the Dutch of olden time did not disappear with their cocked hats and shining knee buckles, and shall hope that when you take your departure you may bear away pleasant memories of the ancient city of Albany.

At the conclusion of the address, which was received with much favor, the President announced that the election of officers was in order, and called Mr. Giles F. Filley, of St. Louis, to the chair. Mr. Grange Sard, Jr., of Chicago, was chosen Secretary. Mr. Filley, on taking the chair, protested his ignorance of parliamentary rules, and requested to be relieved from serving, but his request was denied.

On motion, the following committee was appointed to nominate officers: A. G. Chamberlain, Cincinnati; Charles Eddy, Troy; Ralph Myers, Cleveland; Miles Pratt, Boston; John B. Herron, Pittsburgh.

The committee retired for consultation. Mr. Resor moved that a committee of ten be appointed to consider those points in the President's address relative to the prices obtained and cost of manufacture of stoves. Adopted.

The Committee on Nominations then reported the following officers for the ensuing year:

President—John S. Perry, of Albany, N. Y.
First Vice President—Giles F. Filley, of St. Louis, Mo.

Second Vice President—W. H. Tefft, of Detroit, Mich.

Treasurer—A. Bradley, of Pittsburgh, Pa.

Board of Managers—Joseph W. Fuller, Troy, N. Y.; Sherman S. Jewett, Buffalo, N. Y.; William Resor, Cincinnati, O.; John Truslow, New York; Miles Pratt, Boston, Mass.

The report was received, and the Secretary was empowered to cast the ballot for the association. The ballot elected the nominees of the committee, and the association unanimously approved the election by a rising vote. Mr. Perry was then conducted to the chair by Mr. Tefft, and thanked the association for the continued confidence indicated by his reelection.

He thought other sections of the country should be represented in the office, and his own wish would have been to relinquish his labors and responsibilities; but he submitted to the wish of the association, and would endeavor to discharge the duties of the chair with fidelity. He then announced that the founders of Troy had invited the association to meet them at the Troy Club, and thanked them for the invitation, which he accepted on behalf of the members and guests present.

Mr. Bradley also thanked the association for its confidence in him as Treasurer, especially as the treasury was empty, and suggested that the annual assessment on the members be increased from \$10 to \$20 to meet matured and maturing liabilities. Agreed to.

The president then announced the following committee to consider the president's address: Wm. Resor, Cincinnati; G. F. Filley, St. Louis; Gen. John F. Rathbone, Albany; J. W. Fuller, Troy; S. S. Jewett, Buffalo; John B. Herron, Pittsburgh; W. H. Tefft, Detroit; R. P. Myers, Cleveland; H. Hill, New York; W. H. Whitehead, Chicago.

The president then introduced to the Association Messrs. Kopf and Gurney, of Hamilton, Ontario, members of the Canadian Stove Manufacturers' Association.

Mr. Kopf, in response, thanked the association, and stated there had been an attempt in 1863 to form an association similar to this, but it proved a failure in consequence of the competition and ruinous prices realized. In 1865 the attempt was again renewed, and with success, and since that time prices have steadily advanced, and competing outsiders were growing less in number and losing prestige. He anticipated fresh strength during the coming year, and it was hoped that prices would attain such a standard as would properly remunerate the manufacturers. He believed the Canadian Association would take courage from this association, and increase in prosperity.

The president stated that the question of prices of material and stoves was the main question to be considered by the committee of ten, and he hoped the matter would be discussed by the members.

Mr. Rathbone, of Albany, said he hoped also that an expression of opinion would be had, so that the committee would not be in the dark as to what was required of them. What should be considered was the practicability of an advance from the prices caused by the panic. The manufacturers and industrial classes were not responsible for the panic, and if it had not occurred the balance sheet for the year would have been satisfactory.

He was glad to see so large an attendance. The association had met to look at the future, and the stove business for 1874 would depend in a measure on its action. If the prices were established at proper rates, and the demand kept up, the season of 1874 would be a success, and the figures be on the profit, not the loss side. If the members kept faith with each other, prices would be kept at remunerative but not excessive rates.

Mr. Resor did not think it would be advisable to establish a minimum or scale of prices, but thought the association should report upon cost, and recommend that there be no reduction.

Mr. Filley did not believe it was considered the business of the committee to fix the price of stoves, but thought a standard should be agreed upon and conformed to as closely as possible.

Mr. Resor said he had no great trouble to get scale prices for his goods during 1873, but that it would be difficult to do so in 1874 if the scale was not lowered.

Mr. Merriam did not consider the association a combination to keep up high prices, but believed that it was a society which met to compare notes, exchange ideas, and learn from each other the condition and prospects of trade, etc. In the matter of prices he thought the committee should report a minimum price based upon average cost under existing conditions, but that price should not be absolutely fixed.

Mr. Ransom read the resolution adopted last winter at the Pittsburgh meeting, showing that the report of the committee was recommendatory and the vote not an obligation.

Mr. Chamberlain read the report of the committee presented last summer at the Niagara meeting, showing that it, too, was recommendatory.

Mr. Perry said the Niagara meeting agreed to charge full prices by a rising vote.

Mr. Olhaber said the rising vote was taken merely to secure the sense of the meeting.

Mr. Rathbone did not think the association should undertake to fix prices absolutely. It ought to recommend what should be charged, and all who wanted to make the business reasonably profitable should charge the scale prices. In his judgment it was better to close the foundries than to sell stoves at a loss.

Mr. Jewett said his firm had entered the association without much faith in its benefits, and had not yet been convinced that it was altogether a success; but they would stay in it as long as they could do any good by remaining.

The price had been too high for the past two years. It had unduly stimulated the production of stoves in the United States, and he advised a reduction in the product of the foundries as the only way in which to prevent a heavy overstocking of the market. He thought that low grade stoves should not be held above 6 or 6½ cents, and his preference would be for 6 cents. Members should be allowed to sell under the scale if they must do so to save their trade, and all they ought to be asked to promise was that they would do the best they could.

Mr. Resor considered that such a promise would be too indefinite, and would practically mean nothing.

Mr. Jewett again expressed his belief that it would be impossible to maintain the minimum of 1873 for another year. Mr. Resor thought that large and strong buyers should be favored with better rates than were given to small buyers who carried no stocks, and only bought for their immediate requirements. Mr. Hill thought that while uniformity of action among the members was impossible, they had done well under the circumstances, and generally maintained prices. The committee should ascertain what stoves cost, and base the new scale thereon. If a minimum price was adopted which would afford a living profit, he was willing to trust his associates to maintain it. High prices were undesirable. Mr. Fuller agreed with Mr. Jewett that prices should be fixed on the basis of a moderate profit, and that there was danger of an overproduction in 1874.

Mr. Meyers said the Cleveland members of the association had maintained prices very well, but in doing so had suffered from outside competition.

Mr. Merriam said that no house in the trade had

done more to maintain prices, at greater cost to themselves, than Messrs. Jewett & Root, of Buffalo, and that Mr. Jewett's views should be considered.

Mr. Jewett responded, acknowledging the compliment.

Mr. Tefft thought that different classes of customers should have different rates.

Mr. Sard believed the association had been of great benefit to the trade during the past year. Did not believe the price of stoves could be reduced in proportion to the decline in pig iron without wiping out profits. He thought that every member of the association should sell his stoves at whatever price satisfied him, but that a minimum should be agreed upon as a starting point, although makers should not be obliged to charge it if they could not get it.

Mr. Tefft reported that the committee had done to secure the favorable consideration in Congress of the bill to secure the right of property in patterns of metal castings, and asked that an appropriation be made for the expenses of the committee.

A motion was offered and carried that each member be called upon to pay \$10 into the treasury, and that the president assess the members for such amounts as might be needed.

Mr. Pope, of New York, was introduced, but declined to address the meeting, which then adjourned to meet at 10 A. M. the next day.

THE ENTERTAINMENT AT TROY.

At 2:30 P. M. the members and guests of the association assembled at the depot to enter the special train for Troy. Arriving at the club house, the association was welcomed by Mr. Eddy, on behalf of the Troy founders, and Mr. Perry responded for the visitors. An elegant collation was then served, and at 5:30 the company returned to Albany.

MR. AND MRS. JOHN S. PERRY "AT HOME."

In the evening the company again assembled as the guests of Mr. and Mrs. John S. Perry, at their beautiful home on Washington avenue. A number of ladies were present, and added to the enjoyment of the evening, which passed quickly. The company dispersed about eleven o'clock with pleasant memories of the generous hospitality of their hosts.

THURSDAY'S MEETING.

The meeting was called to order by the chair, and reports of committees were called for.

The committee on prices reported as follows:

From our experience in the results of the past year's business, and fully considering the present and probable cost of the future productions, your committee beg leave to report: That while we distinctly disclaim any intention of combining for the purpose of dictating or establishing a fixed tariff of prices, we believe that a fair and uniform price for our products will favor the interests of all manufacturers, dealers, and consumers; and after a careful review of the situation in all its bearings, we recommend the adoption of the following resolution: *Resolved*, That in the judgment of this convention, in view of the facts above stated, the reduction in the price of stoves, hollow-ware, and castings should not be more than \$10 per ton below the price recommended at our meeting in Pittsburgh in 1873.

Mr. Jewett moved to adopt the resolution.

The chair said that discussion was desirable before the vote was taken.

Mr. Chamberlain did not think discussion would change the sentiment of the meeting, which, in his judgment, was in favor of the resolution.

Mr. Rathbone considered discussion eminently desirable, and hoped there would be a full expression of opinion. The committee had found that the only reduction in the cost of making stoves was in the single item of iron, and he thought \$10 per ton was all that could safely be taken off.

Mr. Hill said the committee felt there was a diversity of opinion existing in the convention, but that they had reported to the best of their judgment. He thought that too many founders had sold stoves for less than actual cost during the past year, and that enough allowance had not been made for the pattern account and other incidental items. Founders must meet competition, of course, and must regulate their prices according to the circumstances in which they find themselves placed.

Mr. Gibbs did not consider a recommendation strong enough. He thought the action of the association imposed a moral obligation upon its members—otherwise, why agree upon a price at all? He approved of the association, but feared it would be of no benefit if it did not absolutely fix a minimum and exact a pledge that stoves should not be sold for less.

Mr. Fuller said the committee only wished to recommend a basis. If manufacturers could not get scale prices, they would, of course, have to take less or lose their business.

Mr. Robertson called to mind the slaughtering of prices a few years ago, and considered that the Association had been of great benefit in saving the trade from a similar course in 1873.

Mr. Gibbs repeated his opinion that the members ought to consider themselves morally bound to maintain whatever price might be agreed upon.

Mr. Chamberlain believed that the recommendation of the committee would be accepted with confidence by the trade, and that its effect would be to stiffen the market.

Mr. Merriam thought the report sensible and judicious; was ready to vote for it, and would pledge himself not to sell his goods for less than they cost him. His remarks were very witty, and caused much amusement.

Mr. Gibbs was ready to vote for it also, but thought that those who voted with him should consider themselves bound to stand up to the price adopted.

A vote was then taken, and the resolution reported by the committee was adopted.

The question of the place of the June meeting was then discussed. Representatives of Boston, Cleveland, St. Louis and the Niagara district took part, but a vote settled the question in favor of Long Branch. Mr. Eddy called for a reading of the bill securing the property right in metal castings, introduced by Mr.

Sumner in the U. S. Senate. The bill, which was published in *The Iron Age* of February 5th, was read by the secretary, and briefly discussed by Mr. Pratt.

Mr. Perry laid before the meeting a letter from Mr. Henry Carey Baird, of Philadelphia, urging on the attention of the founders the importance of securing the introduction of American stoves into the English market.

The letter was received with approval, but it did not call for any definite action.

Mr. Olhaber offered the following:

Whereas, The centennial anniversary of American independence is to be celebrated by a grand industrial exhibition to be appropriately held in Philadelphia; and

Whereas, The stove manufacturers of the United States, as represented by this association, desire to promote the success of the Centennial Exhibition, and to enter the products of their foundries in competition with each other and all the world; and

Whereas, Stoves and heating apparatus are exhibits of a class which require to be exhibited as national products, and not as parts of the products of the States in which they are made; therefore, be it

Resolved, That this association apply for space as the Representative National Association of Stove Manufacturers of the United States, and, as an association, undertake the work of organizing a grand national exhibition of stoves and heating apparatus.

Resolved, That a committee of five be appointed to confer with the Director General on behalf of the association, and make application for space for such an exhibit; and that said committee be authorized to promise, on behalf of the association, that the space granted shall be so apportioned among the exhibiting exhibitors, members of this association, as to insure a full and attractive exhibit of American stoves and heaters, which shall creditably represent the progress and present development of the art of stove founding in the United States; said committee to take such further action as may seem expedient, and report the same at the next meeting.

Adopted. By invitation of the Chair, Mr. Bayles, Editor of *The Iron Age*, addressed the meeting on the subject of the Centennial, as follows:

Mr. Chairman and Gentlemen:

In accepting the invitation with which I am honored to address this Association on the subject of the industrial exhibition with which we are to appropriately celebrate the Centennial Anniversary of American independence, I can scarcely hope to bring to your notice any facts with which you have not already been made more or less intimately acquainted through the public prints. The Centennial Commission have done no work in secret, and the press has rather anticipated than concealed the movements of those to whom the management of the undertaking has been committed. Of the present status of the Centennial I need only say that, while much valuable time has been unfortunately lost on account of the disarrangement of the plans of the Board of Finance, by the late panic, the pledge of national, State and municipal aid to a sufficient amount, in the three and a half millions, (in round numbers) already subscribed or collected, have happily relieved the commissioners of any anxiety on the score of money. By acts of Congress and executive proclamation, the faith of the nation has been pledged to make the Centennial a success; and I do not doubt that the great energies of the world, which are to be gathered to the evidences of our marvellous industrial progress, side by side with the most useful, most beautiful and most interesting productions of nations older and younger than our own, will rise in good time above the yet unbroken lawns of Prospect Park, by the aid of no other power than the potent magic of American enterprise. I speak from my own knowledge when I say that the great work of organizing the Centennial Exhibition has been entrusted to competent and honest hands, and that the interests of the nation will not suffer from mismanagement or neglect.

It is not my intention, gentlemen, to waste your valuable time in general talk about the Centennial, although the interest I feel in the enterprise is so great that I should count no time wasted that might be judiciously spent in discussing the immediate and prospective benefits that may reasonably be expected to result from it. But other and more important business awaits your attention, and I shall be brief. To avoid discursiveness, as well as to definitely limit the time I shall occupy, I have condensed what I shall have to say into a few pages of manuscript, which, with your permission, I will read:

The space in Prospect Park, West Philadelphia, appropriated to the Centennial exhibition, includes, altogether, 450 acres. The location is well chosen. Its elevated position imparts additional dignity and grandeur to the structures, while for convenience it cannot be surpassed. By means of short branch lines connecting with the Pennsylvania Railway, articles for exhibition can be brought by rail within the grounds from any point in the United States, without the necessity of transshipment, if frail or bulky. The buildings already decided upon, and not including such as may be erected by private enterprise to contain exhibits of a special class, are as follows:

The Machinery Hall.
The Agricultural Hall.
The Conservatory.
The Art Gallery—a permanent building to remain as a memorial of the exhibition.
The Grand Pavilion, or Main Exhibition Hall.

Of the last named building, only will I have time to speak, and that briefly; but as it will contain the exhibition proper, a few facts concerning it, sent me a few days ago from the office of the Commission, in Philadelphia, cannot fail to be of interest.

It is designed as a parallelogram having the following dimensions:
Length, including porches, 1876 feet.
Breadth, 812½ feet.
Area of floor for exhibition purposes, 36 acres.
Area of galleries 3 acres.
Area of offices, restaurants, &c., 1½ acres.
Total area available for exhibition purposes, 30½ acres.

The building is composed of twenty-one pavilions, seven in length and three in depth, each pavilion being 240 ft. 10 in. square. The corners of the squares will be cut off so as to form octagonal open courts, of which there will be twelve, besides the 20 semi-octagons on the exterior. The pavilions will be covered with curved roofs, supported on arched ribs or trusses springing from the ground line at the angles and faces of the octagons. These ribs are 3½ feet 4 inches in span, intersecting in pairs at the summit of the arches. Besides these there will be arched ribs, extending from side to side of the squares, having spans of 173 feet 4 inches. The space between the floor and ceiling in the pavilions is 137 feet 8 inches; the height of the center pavilion will be much greater. The galleries will not interfere with the floor space, but will be arranged in the recesses formed by the projections of the gables, and communicate by stairs with the floor level. Their dimensions are 173 feet 4 inches in length and 50 feet in width.

The sides of the octagonal courts before

mentioned will be glazed to a height of 53 feet, and will have ornamental heads and decorations of galvanized iron. The gables and fronts will be glazed to the full height of the ceiling, and skylights provided in the roof, so that ample light will be secured with provision for preventing the direct rays of the sun from penetrating the building.

The interior of the building will be lined with suitable decorative material, colored, and finished to appropriate designs. The space between this lining and the galvanized iron covering being 11 feet, will act as a non-conductor, and assist in keeping the building cool during the hot summer months, means for ventilation being provided in the upper part of the roof.

The articles for exhibition will be divided into departments of classification, arranged in parallel or continuous belts, or zones, surrounding a central aisle of 60 feet in width, and divided in pairs by aisles of 16 feet in width, with transverse aisles of 30 feet and 16 feet in width.

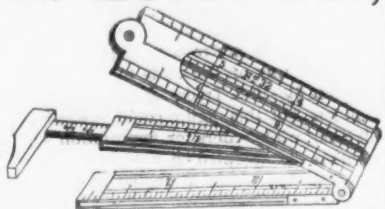
The space allotted to each exhibiting nation will be a segment, or portion, of each belt, or zone, extending from the central aisle to the side of the building. This plan is similar to that of the Paris Exhibition of 1867, but arranged in the form of a parallelogram, instead of an ellipse.

It will thus be seen that the building, although composed of twenty-one separate pavilions, practically forms one vast hall 1669 feet long, 705 feet broad and 137 feet high, the courts merely acting as the columns which support an ordinary ceiling. Magnificent vistas are thus secured in all directions, and an area of 17½ acres will be visible from any central point of observation.

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In its character the exhibition will be, in the broadest sense, national; the extent to which it will be international depends upon the action of other governments; but I have every warrant for the assertion that, should nothing happen in the meantime to provoke the hostility of the now friendly powers of Europe, it will be more truly an international exhibition than either Paris or Vienna. There is something magnificent in the spectacle of our young republic—a century ago a federation of detached and sparsely populated Colonies organized for purpose of defense against foreign oppression—celebrating the centennial anniversary of its birth as a nation with an exhibition of the arts of peace which will eclipse any the world has ever seen, that commands the attention alike of prince and peasant. It is an event for which the world waits, and which, but not one upon which the nations look with disfavor. They would see this young giant which challenges the world to a trial of strength and a comparison of skill. They would know more of this ambitious nation, born of strength which they have lost in the ceaseless outflowing trade of westward emigration—a nation which in a century has spread over a continent, transformed the wilderness in a garden, and planted cities where, within the memory of living men, grew primeval and unexplored forests. They would see what order and beauty has formed itself within the crucible of a politico-social system in which so many heterogeneous and seemingly antagonistic elements have mingled. The thought that, through the bloodless victories of peace, we are achieving an industrial and commercial independence, troubles them. They will come and bring with them their products and manufactures, their works of beauty and utility, that they may retain so rich a market for their wares, or, failing in this, learn if they can the secret of our great progress. I am prepared to say—and here I speak advisedly, for my information is gained from those lately returned from abroad—that more interest is felt throughout Europe to-day in the Centennial Exposition than in any other country five hundred miles from Philadelphia in any direction. The commissioners appointed by the governments of Europe and Asia will be men of the highest standing, and statesmen and savans of their respective countries. The governments of the German Empire, Belgium, the Netherlands, Mexico, Hayti, Ecuador and Brazil have already formally accepted the invitation of the President to participate in the exhibition: England, France, Austria, Italy, Russia, China, Japan and many countries of less extent and importance, will also take part as the work progresses to a successful consummation. There is no reason to believe that we shall be called upon to welcome representatives of the royal families of England, Austria, Italy, Russia, Brazil, Japan and other European and Asiatic kingdoms. Of course, such visitors confer no honor by coming; the honor consists in a national greatness which commands respect, and a national progress which excites curiosity. But we may be sure that what royalty signifies its intention to graciously smile upon and bless with its presence, and the most distinguished statesmen and savans of their respective countries. The governments of the German Empire, Belgium, the Netherlands, Mexico, Hayti, Ecuador and Brazil have already formally accepted the invitation of the President to participate in the exhibition: England, France, Austria, Italy, Russia, China, Japan and many countries of less extent and importance, will also take part as the work progresses to a successful consummation. 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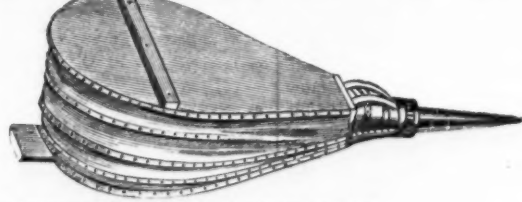


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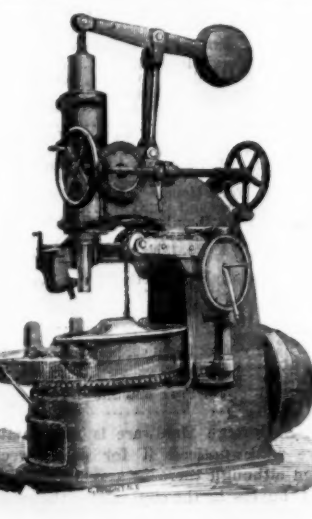
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 Malleable and Gray Iron Castings, galvanized or plain. Also, Brass Castings made to order.
Light Castings.
 We make a specialty, and pay particular attention to this branch of the business.
Nails and Tacks
 well galvanized and do not stick together.
 We have recently enlarged and improved our
Galvanizing Department,
 so that we now stand second to none in the country.
 An experience of Twenty Years in the business should be a sufficient guarantee of our ability to do superior work. A general assortment of
Ship Chandlery,
 Sail and Awning Makers' Hardware constantly on hand.
 Pleasant rooms with power to let cheap, only half mile from Railroad and Steamboat Depots. Address,
WILCOX CRITTENDEN & CO.,
 P. O. Drawer, 134, Middletown, Conn.

COPPER AND ZINC SASH CHAIN.
 The Best and Cheapest made.

BUILDERS' HARDWARE,
 Chain and Pulley for Heavy Sash,
F. & L. MANY & MARSHALL,
 48 Warren Street, NEW YORK,
 Manufacturers of every description of
 Pure Bronzed Metal and Hand-Plated Knobs, Hinges, &c.,
 Agents for Gunter's Black Lead Crucibles,
 Agency and Depot of the TRENTON LOCK COMPANY.

THOMAS MORTON,
 Manufacturer of
Brass & Copper Chain,
 And patented attachments for same, for suspending windows, from 100 to 1500 lbs. Sashes can be suspended with my Chain and attachments in a shorter time and with less trouble than by using the ordinary common cord. I am now offering the Chain and fastenings cheaper than any other in the market. Also manufacturer of the MORTON & BRENNER'S Straight and Circular Spring Balances. Established in 1842.
 Office, No. 15 Murray St., N. Y.

ESTABLISHED 1835
BEMIS & CALL
 HARDWARE & TOOL CO.
 ALL GOODS STAMPED BEMIS & CALL
 NONE OTHERS GENUINE
PATENT FLOOR & DOOR CLAMP,
 Patent Hose Shield,
 and 8 Sizes Rat-bats.
J. A. HAASE, rear 116 V. M. St.
 (East of 107th German Ave.), Philadelphia, Pa.
 Send for Circular.



Trade Report.

OFFICE OF THE IRON AGE.
WEDNESDAY EVENING, Feb. 19, 1874.

The past week has witnessed but little revival of commercial activity, and the general dullness still pervades the financial markets. The failure of Congress to take any action on the subject of national finances, and the uncertainty of its arriving at any satisfactory solution of the grave problems before it, tends to weaken confidence in the immediate future and to inspire a caution which is unfavorable to a revival of business. Evidently, Congress is hopelessly muddled on the subject of the national finances, and the most that can be expected of it this session is that it will patch up some kind of a scheme which will afford a measure of present relief, and, perhaps, lead to an ultimate solution of the question of how the government can meet its enormous responsibilities without imposing a burdensome taxation. In Wall street there has been very little demand for money, even at the low rate of 4 1/2 per cent. on call. Loans on good collaterals have even been effected as low as 3 per cent., and the note shavers have been glad to get good commercial paper at 5 1/2 to 6 1/4 per cent.

The gold market has been strong, with an active speculation, which has carried the premium several points above the average of the past few weeks. The following shows the range of the premium:

	Highest.	Lowest.
Thursday	112 1/2	112 1/2
Friday	112 1/2	112 1/2
Saturday	112 1/2	112 1/2
Monday	112 1/2	112 1/2
Tuesday	112 1/2	112 1/2
Wednesday	112 1/2	112 1/2

The stock market has been irregular, and the uneasy spirits of the Stock Exchange have tried very hard to get up a speculative excitement, with but limited success. On Tuesday considerable commotion was excited by the reading of two forged letters on "Change, one purporting to be a notice of an increase of the capital stock of the Western Union Telegraph Co. to \$50,000,000, and the other informing the Board that 100,000 new shares of Toledo, Wabash and Western were about to be issued. The forgeries were well executed, on the usual letter paper of the companies named, and considerable amount of their stock changed hands at a marked decline. They quickly recovered, however, when the bogus character of the letters was discovered, and should the perpetrators of the swindle be discovered it will probably go hard with them. We give below the highest and lowest of to-day's quotations of active shares:

The bond market has been strong, and prices have somewhat advanced. Railroad mortgages are inactive, but prices are well maintained. We quote below the closing prices of governments:

The following comparisons show the course of the foreign trade during the week:

	1872.	1873.	1874.
Total for week	\$7,319,331	\$11,394,368	\$8,871,703
Prev. reported	30,434,993	42,328,109	33,775,229
Since Jan. 1	\$46,814,331	\$58,692,477	\$42,446,942

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Anvils	70	935
Iron goods	13	\$2,370
Chains and anchors	131	7,448
Copper	4	4,391
Cutlery	105	40,235
Guns	6	1,572
Hardware	49	15,736
Iron pig, tons	1,449	43,239
Iron sheet, tons	40	5,300
R. R. bars	5,410	96,310
Iron cotton ties	911	3,575
Iron, other, tons	213	6,028
Lead, pigs	6,912	41,961
Metal goods	149	20,500
Nails	34	470
Saddlery	19	12,038
Old metal	3,647	3,647
Per. caps	10	2,162
Saddlery	6	1,255
Silverware	1,375	13,189
Tin, boxes	33,772	307,238
Tin, 2,677 elabs	140,268	36,413
Wire	26	6,413
Zinc	16,539	1,267

EXPORTS EXCLUSIVE OF SPECIE.

	1872.	1873.	1874.
For the week	\$4,032,357	\$5,641,336	\$4,545,930
Prev. reported	24,383,644	28,380,951	32,673,408
Since Jan. 1	\$28,423,011	\$34,022,257	\$27,019,358

EXPORTS OF SPECIE.

	1872.	1873.	1874.
Total for week	\$1,149,797	\$1,149,797	\$1,149,797
Previously reported	3,196,100	3,196,100	3,196,100
Total since January 1, 1874	\$4,344,957	\$4,344,957	\$4,344,957

The bank statement shows a decrease in the total reserve of \$1,714,300, caused by the excess of the loss in the specie over the gain in legal tender notes. The total liabilities have decreased \$225,300. The banks now hold, in what is reckoned as lawful money, \$23,917,725 above 25 per cent of their total liabilities. There has been a pause in bank credit inflation, there being an increase in loans compared with last week of only \$979,000. The legal tender strength of the banks is greater than last week. The following is a comparison of the bank figures for the past two weeks:

	Feb. 7.	Feb. 14.	Difference.
Loans	\$277,237,100	\$278,217,000	\$979,900
Specie	33,230,700	30,687,200	2,543,500
L. g. Ten.	59,052,900	50,872,700	8,180,200
Deposits	229,938,800	234,770,700	4,831,900
Circulation	29,965,800	29,895,400	70,400

Government bonds closed as follows:

	Bid.	Asked.
U. S. Currency 6s	116 1/2	117
U. S. 6 1/2 1881, reg.	120 1/2	120 3/4
U. S. 1881, cou.	120 1/2	120 3/4
U. S. 6 1/2 30 reg., May and Nov	119 1/2	119 3/4
U. S. 5 1/2 1862, cou.	118 1/2	118 3/4
U. S. 5 1/2 1864, cou.	120 1/2	120 3/4
U. S. 5 1/2 1865, cou.	120 1/2	120 3/4
U. S. 5 1/2 1867, reg., Jan. and July	119 1/2	119 3/4
U. S. 5 1/2 1867, cou.	120 1/2	120 3/4
U. S. 5 1/2 1868, cou.	120 1/2	120 3/4
U. S. 10-40 reg.	112 1/2	112 3/4
U. S. 10-40 cou.	115 1/2	115 3/4
U. S. 5 1/2 1861 reg.	113 1/2	113 3/4
U. S. 5 1/2 1861 cou.	113 1/2	113 3/4

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. C. & Hudson consolidated	104 1/2	104 1/2
Lake Shore	82 1/2	82 1/2

Rock Island	107 1/2	107 1/2
New Jersey Central	107 1/2	107 1/2
Del. Lack. and Western	111 1/2	111 1/2
Washington	51 1/2	50 1/2
Harlem	132 1/2	132 1/2
Western Union Telegraph	75 1/2	75 1/2
Atlantic & Pacific Telegraph	18 1/2	17 1/2
Northwestern	59 1/2	59 1/2
Northwestern Preferred	75 1/2	75 1/2
Milwaukee & St. Paul pref.	73 1/2	73 1/2
Milwaukee & St. Paul	47 1/2	47 1/2
Pacific Mail	42 1/2	42 1/2
Erie	48 1/2	48 1/2
Ohio & Mississippi	33 1/2	32 1/2
Union Pacific	35 1/2	35 1/2
C. & Ind. Central	32 1/2	32 1/2
Atlantic & Pacific Preferred	20 1/2	20 1/2
Hannibal and St. Joseph	38 1/2	38 1/2
Hannibal and St. Joseph Preferred	41 1/2	40 1/2
Consolidation Coal	49 1/2	48 1/2

GENERAL HARDWARE.

Trade is generally reported as good, but there are few buyers here, and the bulk of the orders received are by mail. Travelers are, we believe, generally doing well, some of them reporting this as the best trip they ever made.

James M. Coppernoll, for many years connected with the John Russell Mfg. Co., and for the past two years with Landers, Fry & Clark, died after a brief illness, at his residence in Brooklyn, E. D., on the morning of the 17th instant, aged 57 years. Few men in the trade were more widely or favorably known. He will long be remembered by those who had intercourse with him as an earnest, straight-forward, consistent Christian man. The Brooklyn Times, published in the district in which he lived, closes a feeling tribute to his memory with the following truthful paragraph:

"Mr. Coppernoll's death is a loss to the entire community, whose best interests, political, moral, philanthropic, reformatory and religious, he strove to the utmost of his ability to promote. A great-hearted, high-minded, well-balanced, strong man has fallen, leaving a legacy in his example worth much to all who shall know how to profit by its use."

The funeral will take place at 2 o'clock on Thursday afternoon, at the Bedford Avenue Reformed Church, corner of Bedford Avenue and Clymer street, Brooklyn, E. D.

The prices of Brass and Silver Capped Screws have been reduced as follows:

Flat Head Brass Capped	dis. 50 to 10%
Round " "	dis. 30 to 50%
Flat Head Silver	dis. 30 to 50%
Round Head Silver	dis. 30 to 50%

The Hart, Bliven & Mead Mfg. Co. have issued an appendix to their catalogue of last year, containing a large variety of new goods, principally in the line of Builders' and Stationers' Hardware. The whole is finely illustrated, and is got up in the handsome style of the recent publications of this company.

Apropos of the letter of Miller Brothers' Cutlery Company, which appeared in our issue of the 5th inst., we have received the following communication:

To the Editor of The Iron Age: Mr. John W. Wilson, the famous artisan of Sheffield, is not so ignorant of Miller Brothers' cutlery as they think he is. Before I left for England last May I bought a few of their excellent pen knives, and gave two of them to my friend as a sample of American cutlery. He admired them in many respects, and thought they might be improved. For instance, the blades he thought were not as well ground as those of the best Sheffield knives, but acknowledged they were superior to any foreign knives he had seen. I told him the impression was getting to be very general in America, that in a very few years there would be but little, if anything, in the line of cutlery or tools imported from Sheffield. I showed him samples of our Chisels and Gouges, which he admitted to be equal to any in the world, and expressed a regret that the American cutlery and edge tool firms were not better represented at Vienna. I told him there was very little improvement, and our foreign rivals would be more benefited than we should. But if he wished to see American productions at their best, to come to our American Exposition in 1876, and report on it as he had done at London, Paris and Vienna.

RICHARD T. BUCK.

Millbury, Mass., Feb. 10, 1874.

Alfred Field & Co., No. 47 John street, have taken the agency of Withington, Cooley & Co.'s Garden and Farming Tools, and will carry a stock of these goods in New York, or orders can be shipped from the factory at Jackson, Mich., as desired. We publish below the revised list for these goods, the discounts from which to the jobbing trade are as follows:

Socket and Solid Shank Hoes	discount 25 to 30%
Planting Plant Hoes	discount 25 to 30%
Weeding Hoes and Rakes	discount 25 to 30%
Garden Rakes	discount 25 to 30%
Potato and Manure Forks	discount 25 to 30%
"Stir" Hay and Manure Forks	discount 25 to 30%
"Nonpareil" Barn Forks	discount 25 to 30%
"W. C. & Co." Hay, Manure, Spading, and Mining Forks	discount 25 to 30%
"B. Norris & Co." Forks	discount 25 to 30%
Grain Cradles	discount 25 to 30%
Scythe Snaths	discount 25 to 30%
Revolving Horse Rakes	discount 25 to 30%
Corn and Hay Knives	discount 25 to 30%
Fingers, Handles and Ferrules	discount 25 to 30%

HOES, &c.

Socket and Solid Shank Hoes.

Ivanhoe, extra C. S. Socket—Mirror Blade	Per doz. \$10.00
No. 1, Best Cast Steel Socket	9.00
No. 2, Best Cast Steel Socket	8.25
No. 3, Best Cast Steel Socket	8.00
No. 4, Ladies' "	6.00
No. 10, Boys' "	6.00
No. 7, Toy "	4.50
No. 5, Onion "	6.00
Square Top	6.00
No. 6, Mortar Cast Steel Socket, 6 foot handle, 10 inch blade	13.00
No. 12, California Cast Steel Socket, 5 1/2 foot handle, 9 inch blade	12.00
North River Cast Steel Socket	8.00

Planting Plant Hoes.

No. 0, Polished C. S. Planters, handled, 7-inch blade	10.50
No. 1, Polished C. S. Planters, handled, 7 1/2-inch blade	11.00
No. 2, Polished C. S. Planters, handled, 8-inch blade	11.50

Weeding Hoes and Rakes.

No. 1, Polished C. S., 4-tooth Weed Hoe and Rakes	8.50
No. 2, Polished C. S., 6-tooth Weed Hoe and Rakes	9.50
No. 3, Polished C. S., Sharp Point Weeding Hoes	7.50
No. 4, Polished C. S., Two-prong Weeding Hoes	7.00

Garden Rakes.	
No. 0, Polished Cast Steel, 6-tooth	6.00
No. 1, " " " " " "	8.00
No. 2, " " " " " "	9.00
No. 3, " " " " " "	10.00
No. 4, " " " " " "	11.00
No. 5, " " " " " "	12.00
No. 6, " " " " " "	13.00
No. 7, " " " " " "	14.00
No. 8, " " " " " "	15.00
Loose or Gravel Rakes same price as Cast Steel	

Garden Rakes.

Potato and Manure Hooks.

Solid Steel Shanks.

No. 1, Rd., 4-tine, C. S. Potato Hooks, Goose Neck	7.50
No. 6, Fl., 4-tine, C. S. Potato Hooks, red and blue, extra finish	8.50
No. 8, Rd., 5-tine, C. S. Potato Hooks, Goose Neck	9.00
No. 7, Rd., 5-tine, C. S. Potato Hooks, Goose Neck	10.50
No. 3, 5-tine, Rd., Mail Iron Potato Hooks	5.50
No. 5, 4-tine, Rd., C. S. Manure Hooks, 5 ft. handle	1.50

Hoes and Forks of special sizes and styles made to order.

JACKSON STAR FORKS.—Red Finish.

Made of the best cast steel, highly finished, and of tested temper. Handles of second growth and selected white ash.

Star Hay Forks.

No. 10, Oval, 3-tine, C. S., Common Ferrule	\$10.50
No. 10, " " " " " "	12.00
No. 10, " " " " " "	11.00

Star Manure Fork.—Double Ferrule, Solid Steel Shanks.

No. 8, Oval, 4-tine, L. H. C. S., Com'n Ferrule	14.00
No. 8, " " " " " "	15.50
No. 9, " " " " " "	14.50
No. 9, " " " " " "	16.00
No. 10, " " " " " "	20.50
No. 10, " " " " " "	22.00

Nonpareil Barn Forks.—Patented Dec. 19, 1871.

No. 13, Oval, 4-tine, Nonpareil, Common Ferrule	14.00
No. 13, Oval, 4-tine, Nonpareil, Strap Ferrule	15.50

W. C. & Co. Hay and Straw Forks.—Blue Finish.

No. 2, Oval, 2-tine, C. S., Common Ferrule	7.25
No. 2, " " " " " "	8.75
No. 4, " " " " " "	9.00
No. 4, " " " " " "	10.50
No. 4, " " " " " "	9.50

W. C. & Co. Manure Forks.—Blue Finish.

No. 1, Round, 4-tine, L. H. C. S., Common Ferrule	12.00
No. 1, Round, 4-tine, L. H. C. S., Strap Ferrule	13.50
No. 2, Round, 4-tine, D. H. C. S., Common Ferrule	12.50
No. 2, Round, 4-tine, D. H. C. S., Strap Ferrule	14.00
No. 5, Oval, 4-tine, L. H. C. S., Common Ferrule	12.50
No. 5, Oval, 4-tine, L. H. C. S., Strap Ferrule	14.00

No. 6, Oval, 4-tine, D. H. C. S., Common Ferrule

No. 6, Oval, 4-tine, D. H. C. S., Strap Ferrule

Manure Forks put up with Slotted Ferrules to order.

W. C. & Co. Spading and Mining Forks.—Blue Finish.

No. 7, C. S., 4-angular tine, D. H. Spading, Common Ferrule	18.00
No. 8, C. S., 4-angular tine, D. H. Spading, Strap Ferrule	19.50
No. 11, C. S., 5-angular tine, D. H. Spading, Common Ferrule	24.00
No. 12, C. S., 5-angular tine, D. H. Spading, Strap Ferrule	25.50
No. 9, C. S., 4-tine, L. H. Oval Back Slit, Strap Ferrule	25.00
No. 10, C. S., 4-tine, D. H. Tanners' Strap Ferrule	30.00

R. Norris & Co. Forks.

2-tine, less per doz. than regular W. C. & Co.	7.50
4 " " " " " "	1.50

Norris Forks put up with plain Ferrules only.

wood goods.

Grain Cradles.

No. 1, Morgan Cradles & Scythes, Wood Base, \$35.00	Per doz. \$35.00
No. 1, " " " " " "	38.00
No. 2, Telegraph Cradles and Scythes, Wood Base	36.00
No. 3, Turkey Wing Cradles & Scythes, Wood Base	34.00
No. 3, Turkey Wing Cradles and Scythes, Iron Base	36.00

Packing cases of 1 dozen, each \$1.50; of 5 dozen, each \$1.25, n. t.

The above prices are for Cradles put up ready for use, or fitted and parts numbered preparatory to shipment in boxes or otherwise. Cradles not fitted, \$1.50 per dozen less; without Scythes, \$1.50 per dozen less than the above prices. Orders for Cradles should state explicitly in what condition they are wanted shipped.

Scythe Snaths.

No. 1, Patent Screw Nib, Brass Ferrule and Slide Socket	Per doz. \$5.50
No. 2, Patent Screw Nib, Iron Ferrule and Socket	7.50
No. 3, Common Screw Nib, Socket	6.00
No. 0, Patent Screw Nib, Brass Ferrule, Plate	9.00
No. 02, Patent Screw Nib, Iron Ferrule, Plate	8.25
No. 00, Patent Screw Nib, Iron Ferrule, Patent Loop Heel	9.50
No. 000, Patent Screw Nib, Brass Ferrule, Patent Loop Heel	10.00
Bush, Patent Screw Nib, Iron Ferrule, Double Ring	9.00
Mulay, Patent Screw Nib, Iron Ferrule, Plate	10.00

Revolving Horse Rakes.

No. 0, 14 Round Teeth, Wood Stop, Frame Draw, 8 1/2 feet head	5.50
No. 1, 16 Round Teeth, Wood Stop, Frame Draw, 10 feet head	6.00
No. 2, 14 Square Teeth, Iron Spring, Bent Draw, 8 1/2 feet head	7.00
No. 3, 16 Square Teeth, Iron Spring, Bent Draw, 10 feet head	7.50
No. 4, 14 Square Teeth, Chaplin's Patent Steel Spring, Adjustable	8.50
No. 5, 16 Square Teeth, Chaplin's Patent Steel Spring, Adjustable	8.50
No. 6, 14 Square Teeth, Henderson's Patent Steel Spring, Adjustable	8.50
No. 7, 16 Square Teeth, Henderson's Patent Steel Spring, Adjustable	8.50

Sundries.

Corn and Hay Knives.

	Grain Cradles.	Per doz.
No. 1, Morgan Cradles & Scythes, Wood Brace.		\$35.00
No. 1, " " " Iron " "		38.00
No. 2, Telegraph Cradles and Scythes, Wood		

taken in equal monthly proportions, at current monthly circular prices throughout the season, with the right to the purchaser to decline to take the proportion due in any month, such declination not to give him the right, however, in the succeeding month to take an increased quantity in lieu of that so declined. Should any such proposition be accepted, in whole or in part, the applicant will be notified of such acceptance immediately after the first of April."

The quantity sent from the Schuylkill region for last week was 39,067 tons, against 52,875 for the corresponding week last year—a decrease of 13,808 tons.

The trade in Bituminous Coal continues very dull, and prices are without quotable change. The rates are: for West Virginia Gas, \$8.50 @ \$9; Cumberland Soft, \$6.75 @ 7; the quantity shipped over the Cumberland & Pennsylvania Railroad for the week ending February 14th was 21,443 tons, against 23,556 tons in 1875, showing a decrease of 2413 tons. Over the Cumberland Branch Railroad there was transported during the same period 2332 tons—a decrease on the shipments for the corresponding week in 1875 of 644 tons.

Exports for the week Tons.
Exports from January 1st 7,420
Exports same time last year 13,968

The market for foreign has been very quiet, and there are no changes in prices. The quotations are: Liverpool House Cannel, \$3.0; Liverpool Gas, \$11; Newcastle Gas, 80; Scotch Ld., \$11, currency.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York for the week ending February 17, 1876:

Hardware.	Henderson Bros.
Boker Hermann & Co.	Plat. tons, 40
Mdse. pkgs., 8	Scrap, tons, 64
Drexel, Morgan & Co.	Lennox E. S.
Gun barrels, &c., 10	Bale ties, tons, 34
Derron & Son & Co.	Moore's J. P. Sons,
Chains, 9	Bundles, 130
Casks, 3	Naylor & Co.
Field A. & Co.	Fish plates, bds., 311
Mdse. pkgs., 4	Rexes Osborn & Co.
Chains, &c., 19	Scrap, tons, 27½
Avails, 69	Order
Packages 9	Pig, tons, 800
Friedlman & Lauterjung	Sheet, bds., 5
Grindstones, Collin's,	Fish plates, bds., 75
Hilger E. & Sons.	Steel.
Ironware, &c., 14	Cookayne J. W.
Harnar Wm. & Co.	Cases, 5
Packages, 14	Garvin E. L. & Son
Lau & Gerliche,	Bundles, 159
Mdse. pkgs., 2	Hogan John.
Arms, &c., 2	Bundles, 10
Lawton Bros. & Co.	Cases, 24
Cases, 2	Cases, 2
Laund & Co.	Jackson Wm & Son,
Wire, pkgs., 6	Bundles, 55
Moore's J. P. Sons,	Cases, 2
Guns, &c., 2	Bars, 1
Mason John W. & Co.,	Naylor & Co.
Bells, 7	Finger bars, 7
Mechanics Dispatch Co.,	Cases, 10
Packages, 11	Vose, Dinmore & Co.
Puze E. & Co.	

Casks, 1	Bundles, 134
Ramelsburg & Co.	Bessemer brick, 500
Aras, exc. 2	
Russell & Erwin Mfg. Co.	Metal.
Files, cks., 2	Barthold R. R.
Roosevelt S. & Co.	Scrap copper, bxs, 15
Packages, 2	Bundles, 3
Schweitzer Mfg. Co.	Bruce & Cook,
Mds., pkgs., 4	Tin plates, bxs., 290
Tillotson L. G. & Co.	Byrne Joseph,
Wire, 1-cy, 270	Tin, ingots, 1149
Van Art & McVey,	Terne plates, bxs.,
Cases, 2	800
Mds., pkgs., 13	Cort N. L. & Co.
Wood W. A.,	Terne plates, boxes,
Cases, 3	125
Ward A.,	Darrel & Co.
Mds., pkgs., 4	Scrap, brass, pkgs., 14
Wiebush F.,	Scrap, copper, pkgs.,
Mds., pkgs., 43	40
Chalus, kegs, 19	Scrap, lead, pkgs., 5
Order,	Naylor & Co.
Files, cks., 19	Tin plates, bxs., 4
	Phelps, Dodge & Co.
IRON.	Tin plates, bxs., 3221
Artis J. J.,	Tin, ingots, 532
Scrap, tons, 75	Reeves, Osborne & Co.
Behnia S. de,	Scrap, brass, lbs, 139
Old rails, 24	Scrap, copper, lb-
Congreve Chas. & Son,	680
Rails, 1045	Scrap, pewter, lbs.,
Crocker Bros.	620
Pig tons, 1093	Scrap, lead, lbs, 5960
Darrell & Co.	Order,
Scrap, pkgs., 84	Tin, ingots, 900
Elyter Bros.	Tin and terne plates,
Hoop, bdls, 480	bxs., 11,498

figures. Some parties of experience in the trade appear to look upon the present figures as likely to be those of the season, and argue that in the absence of new enterprises, the demand for pig metal will not be sufficient to advance the price above present rates, while the cost of manufacture cannot permit of its being sold materially under these. Probably the truth is that there has not been sufficient business done since the new year, to give an indication of what the year will offer. It is clear that all large corporations are awaiting the action of Congress, on the currency question, before entering in any operations requiring large outlay. The demand for rails, however, and the reports of better orders from the bar mills, would indicate the opening of whatever amount of trade there is to be for the spring. From the West considerable improvement is reported, and most of the Pittsburgh mills are fairly busy on orders, with some of them running double turn. Bars here and in slightly better demand at firmer quotations. Rails are comparatively active, with some considerable transactions noted. Old Rails are still rather speculatively dealt in than purchased for immediate consumption, although some parcels have been taken by Pennsylvania mills. Scrap is rather firmer, and in very short supply.

The following quotations represent the prices ruling at this date, viz.:

Pitt Mills No. 1 Foundry, 84½; No. 2, 84; Gray Forge, \$30.

BARs—3½c per lb.

RAILs—\$ 5 for American, at work—

OLD RAILs—\$401 \$ 51 50

SCRAP \$41 to \$42.

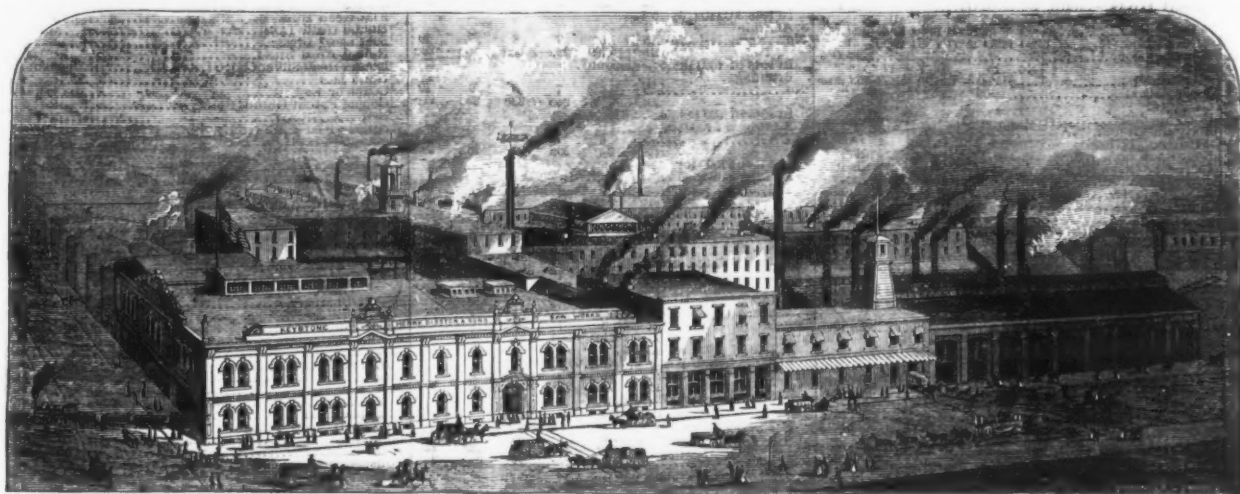
The sales include small lots of Fairbanks quotations: 1 100 lb. Muck Bar at \$ 4½ to 5.

be \$36 at furnace. The men who were liberally paid for Gray Forge Co.'s sales reported of 2300 tons of iron. There was trouble at the Crane Iron Co.'s furnace, at Catawauqua, with labor. The men demanded an advance which the company refused and threatened to blow out all their furnace if it is persisted in.

[For balances of Trade see 11th page.]

Keystone Saw, Tool, Steel and File Works,

PHILADELPHIA.



HENRY DISSTON & SONS,

MANUFACTURERS OF

Warranted Cast Steel Patent Ground & Tempered Hand, Panel & Rip Saws,

Disston & Sons' Patent Improved Combination Hand Saws,
 "Mechanics' Own" Hand and Back Saws, to run without Set,
 Gent's Half Back Bench Saws,
 Cast Steel Compass Saws,
 Cast Steel Table and Pruning Saws,
 Improved Quality Cast Steel Back Saws, with Steel Backs,
 Butchers' Bow Back Saws,

Turning or Chair Webs,
 Felloe Webs,
 Butchers' Saw Blades,
 Improved Reversible Hack Saws,
 Hack Saw Blades,
 Patent Ground and Tempered Cast Steel Wood Saws,
 Wood Saw Frames,

Saw Handles, all kinds,

Patent Ground and Tempered Circular Saws, Circular Top Saws for Double Mills,

Warranted Extra Cast Steel Shingle Saws, Concave Saws, Circular Saw Mandrels of the latest and most approved styles

Warranted Extra Cast Steel Patent Ground and Tempered Mill, Mulay, Gang and Drag Saws.

Disston's "Great American" Cross Cut Saw.

"	"	"	"
"	"	"	"
"	"	"	"
"	"	"	"

Extra Spring Steel Plain Tooth Cross Cuts, Set and Sharpened.

Hook Tooth Cross Cut Saws No. 2, Set and Sharpened.

Hook Tooth Cross Cut Saws No. 3, Set and Sharpened.

Cast Steel Plain Tooth Cross Cuts Nos. 2 & 3, Set and Sharpened.

HENRY DISSTON & SONS' WARRANTED SAW FILES.

We manufacture Files specially adapted for keeping in order the Teeth of our Improved Cross Cut Saws, "The Great American," "The Lumberman," "The Climax," "The Nonpareil."

NOTICE.

Our No. 7 Hand Saws have attained a National reputation for uniform excellence of manufacture, of which we are justly proud, and we take this method of assuring the trade that these Saws for 1874, will exceed in point of finish all previous efforts to meet the wishes of our friends.

[illegible]

Circles less than 4 inch in diameter..... 38c. # 20
Circles, 4 inch diameter and over..... 41c. # 20
Segment and Pattern Sheets..... 38c. # 20
Locomotive Fire Box Sheets..... 38c. # 20
Sheathing Copper, over 12 oz. per sq. ft..... 38c. # 20
12 oz. # sq. ft. and lighter..... 41c. # 20
Bolt Copper..... 38c. # 20
No Copper is sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

14x48, by the case..... 8c. # sheet
14x48, less than case..... 10c. # sheet
Bolt sizes, 7 and 8 inch..... 12c. # sheet
9 inch..... 15c. # sheet
Other sizes not larger than 80x60..... 25c. # sq. ft.
Copper Bottoms, 36c. # #
O'NEILL'S PATENT PLANISHED COPPER..... 14x48

14 and 16 oz. and heavier..... 38c. By the case, 36c. # 20
12 oz. and lighter..... 41c. # 20

7 in., 14x36, 8 in., 14x36, 9 in., 14x40
14 and 16 oz. and heavier..... 41c. By the case, 40c. # 20
(And all sizes not over 30 inches wide.)

14 and 16 oz. and heavier..... 41c. # 20
12 oz. and lighter..... 41c. # 20

LEAD-DUTY: Pig 42 per 100 lbs.; old lead, 15c. per lb.; Pipe and Sheet, 25c. per lb. All subject to a reduction of 10 per cent.

Spanish..... 65c. # 60 gold
German refined..... 65c. # 60 gold
English..... 74c. # 60 gold

Bar..... 10c. # 100
Pipe..... 10c. # 100
Tin Lined Pipe..... 10c. # 100
Sheet..... 10c. # 100
Shot..... 10c. # 100

Solder No. 1, 18c. # 100; No. 2, 15c. # 100
Solder No. 1, 18c. # 100; No. 2, 15c. # 100

STEEL-DUTY: Pig 42 per 100 lbs.; old lead, 15c. per lb.; Pipe and Sheet, 25c. per lb. All subject to a reduction of 10 per cent.

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Solder No. 1, 18c. # 100; No. 2, 15c. # 100

Colored..... 25c. # 20
Mixed wools..... 25c. # 20
Soft wools..... 25c. # 20
Gunny bagging..... 25c. # 20
Jute Butts..... 25c. # 20
Kentucky bagging..... 25c. # 20
Book stock..... 25c. # 20
Waste paper and scraps..... 25c. # 20
Nep cuttings..... 25c. # 20
Kentucky Bale rope..... 25c. # 20
Oakum, No. 1..... 25c. # 20
Grass rope..... 25c. # 20
Tarted Shaking..... 25c. # 20

Old Metal..... 25c. # 20
Yellow metal..... 25c. # 20
Brass..... 25c. # 20
Heavy Composition..... 25c. # 20
Old lead, solid..... 25c. # 20
Tea lead..... 25c. # 20
Wrought iron..... 25c. # 20
Sheet iron..... 25c. # 20
Cast iron..... 25c. # 20
Machinery iron..... 25c. # 20
Zinc..... 25c. # 20
Pewter, No. 1..... 25c. # 20
Pewter, No. 2..... 25c. # 20
Spelter..... 25c. # 20

Paints, Oils, etc..... 25c. # 20
Black, lamp-Coch Paints..... 25c. # 20
Ivory Drop, fair..... 25c. # 20
Black Paint, in oil..... 25c. # 20
Blue, Prussian, fair to best..... 25c. # 20
Chinese, dry..... 25c. # 20
Ultramarine..... 25c. # 20
Brown, Spanish..... 25c. # 20
Van Dyke..... 25c. # 20
Carmine, 40..... 25c. # 20
Green, Chrome..... 25c. # 20
Paris..... 25c. # 20
Mineral Paints..... 25c. # 20
Orange Mineral..... 25c. # 20
Red Lead, American..... 25c. # 20
Venetian (N. C.) dry..... 25c. # 20
Indian, dry..... 25c. # 20
Senna, American, raw..... 25c. # 20
Burnt..... 25c. # 20
Raw..... 25c. # 20
Umber, Burnt..... 25c. # 20
Raw..... 25c. # 20
Vermilion, Chinese..... 25c. # 20
English..... 25c. # 20
American, Common..... 25c. # 20
White Lead, American, pure dry..... 25c. # 20
White, Paris, English, prime..... 25c. # 20
Yellow Ochre, French..... 25c. # 20
Vermont..... 25c. # 20
Chrome..... 25c. # 20
Zinc White, American No. 1 dry..... 25c. # 20
French (Paris)..... 25c. # 20

Oils..... 25c. # 20
Lined Raw..... 25c. # 20
Boiled..... 25c. # 20
Whale, Crude..... 25c. # 20
Bleached Winter..... 25c. # 20
Sperm, Crude..... 25c. # 20
Winter unbleached..... 25c. # 20
Seal, Extra Refined..... 25c. # 20
Lard, Pure Winter..... 25c. # 20
Spring..... 25c. # 20
Cotton seed, Crude..... 25c. # 20
Southern Yellow..... 25c. # 20
White..... 25c. # 20
Neatfoot, Winter..... 25c. # 20
Natural Lubricating..... 25c. # 20

Sandries..... 25c. # 20
Asphaltum..... 25c. # 20
Benzine..... 25c. # 20
Chalk..... 25c. # 20
Block..... 25c. # 20
Dryer, Patent, Am'n..... 25c. # 20
Flocks..... 25c. # 20
Frostings..... 25c. # 20
Glauber's Salts, Zinc..... 25c. # 20
Gun, Copal..... 25c. # 20
Damar..... 25c. # 20
Shellac, English..... 25c. # 20
Litmus..... 25c. # 20
Pumice Stone, selected Lumps..... 25c. # 20
Pumice Stone, powdered..... 25c. # 20
Putty in bladders..... 25c. # 20
Rotten Stone, soft, English..... 25c. # 20
Spirits Turpentine..... 25c. # 20
Whiting, Spanish..... 25c. # 20

Glasses..... 25c. # 20
French Window-latt, 2d, 3d, and 4th qualities. Per box of 50 feet..... 25c. # 20

SIZES..... 25c. # 20
I. II. III. IV.

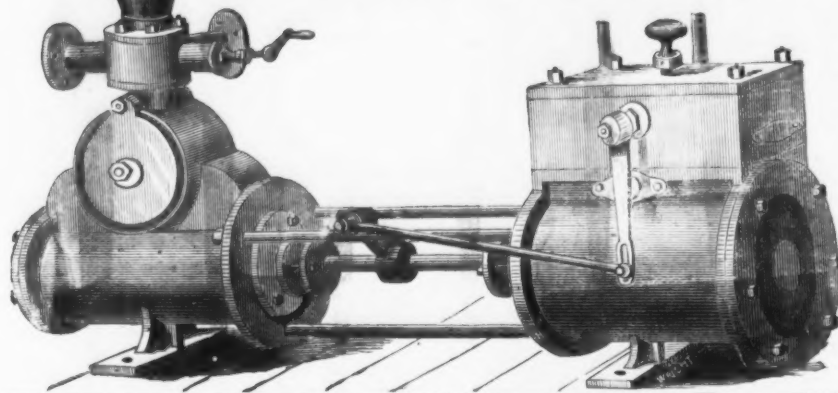
6 x 8 to 7 x 9..... 25c. # 20
8 x 10 to 10 x 14..... 25c. # 20
10 x 15 to 12 x 16..... 25c. # 20
12 x 18 to 16 x 20..... 25c. # 20
15 x 22 to 18 x 24..... 25c. # 20
18 x 26 to 22 x 28..... 25c. # 20
22 x 30 to 26 x 32..... 25c. # 20
26 x 34 to 30 x 36..... 25c. # 20
30 x 38 to 34 x 40..... 25c. # 20
34 x 42 to 38 x 44..... 25c. # 20
38 x 46 to 42 x 48..... 25c. # 20
42 x 50 to 46 x 52..... 25c. # 20
46 x 54 to 50 x 56..... 25c. # 20
50 x 58 to 54 x 60..... 25c. # 20
54 x 62 to 58 x 64..... 25c. # 20
58 x 66 to 62 x 68..... 25c. # 20
62 x 70 to 66 x 72..... 25c. # 20
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82 x 90 to 86 x 92..... 25c. # 20
86 x 94 to 90 x 96..... 25c. # 20
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122 x 130 to 126 x 132..... 25c. # 20
126 x 134 to 130 x 136..... 25c. # 20
130 x 138 to 134 x 140..... 25c. # 20
134 x 142 to 138 x 144..... 25c. # 20
138 x 146 to 142 x 148..... 25c. # 20
142 x 150 to 146 x 152..... 25c. # 20
146 x 154 to 150 x 156..... 25c. # 20
150 x 158 to 154 x 160..... 25c. # 20
154 x 162 to 158 x 164..... 25c. # 20
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238 x 246 to 242 x 248..... 25c. # 20
242 x 250 to 246 x 252..... 25c. # 20
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250 x 258 to 254 x 260..... 25c. # 20
254 x 262 to 258 x 264..... 25c. # 20
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294 x 302 to 298 x 304..... 25c. # 20
298 x 306 to 302 x 308..... 25c. # 20
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306 x 314 to 310 x 316..... 25c. # 20
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482 x 490 to 486 x 492..... 25c. # 20
486 x 494 to 490 x 496..... 25c. # 20
490 x 498 to 494 x 500..... 25c. # 20
494 x 502 to 498 x 504..... 25c. # 20
498 x 506 to 502 x 508..... 25c. # 20
502 x 510 to 506 x 512..... 25c. # 20
506 x 514 to 510 x 516..... 25c. # 20
510 x 518 to 514 x 520..... 25c. # 20
514 x 522 to 518 x 524..... 25c. # 20
518 x 526 to 522 x 528..... 25c. # 20
522 x 530

GUILD & GARRISON'S STEAM PUMP WORKS,

Nos. 30 to 34 First Street, Williamsburgh, N. Y.

MANUFACTURERS OF

STEAM PUMPING MACHINERY



Of all descriptions and for all purposes, of any proportion or size, for pumping Hot, Cold, Fresh, Salt, Mudd or Gritty Water, Grain-mash, Syrups all kinds of Beer, Acids, Molasses, and all heavy and thick fluids. Also for Feeding Steam Boilers, Supplying Tanks, and for Sugar Refineries, Tanneries, Oil Refineries, Gas Works, Hotels, Breweries, and for all classes of manufactories; for Draining Mines and Excavations, and for Rolling Mills, Blast Furnaces and Water Works supplying Cities, Towns and Villages with Water; also for erecting purposes and Steam Fire Engines for Land and Sea.

All Work from this Establishment fully Warranted.

Catalogues mailed on application.

Associated Steel.

MAYNARD & VAN RENSSLAER,
CONSULTING
Mining and Metallurgical
ENGINEERS,
Experts in Iron and Analytical Chemists
24 Cliff Street, NEW YORK,
George W. Maynard. Schuyler Van Rensselaer.

THOMAS M. DROWN,
Analytical Chemist
And Consulting Metallurgist,
1123 Girard Street, Philadelphia.
Analysis of Irons, Steels, Alloys, Ores, Coals
Smelting Products, etc. Iron and coal lands examined,
surveyed and valued.

TO CAPITALISTS.

The subscriber will sell exclusive rights, for separate States, to manufacture Wrought Iron and Steel by his patent processes, and take payment in part interest in the business, and will erect Blast furnaces and Wrought Iron and Steel works when required (for manufacturing by his processes), upon the most approved models in this country and Europe.

These processes produce "from ordinary coke pig iron the purest iron ever made," and which is equal to the highest class Swedish and Norwegian Irons for Cast Steel and tools, and to Low Moor Iron for engineering purposes, and at less than one-half the cost of those Irons.

He can refer to manufacturers and consumers of the highest standing, and to scientific tests by the best authorities.

JAMES HENDERSON,
30 Broadway, NEW YORK.

The Iron-Masters' Laboratory.

Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags & Coal for Practical Metallurgical Purposes.

No. 339 Walnut Street, Philadelphia.
J. BLODGET BRITTON,

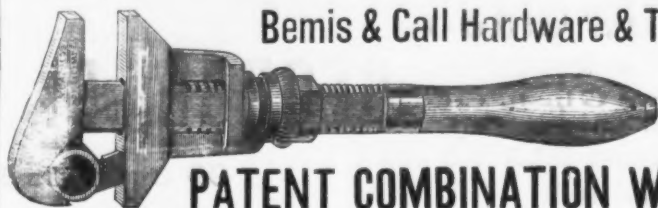
This Laboratory was established in 1866, at the instance of a number of practical iron-masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it as convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

CHARGES TO IRON WORKS.

For determining the per cent. of pure Iron in an ordinary Ore..... \$4 00
For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12 50
For each additional constituent of usual occurrence..... 1 50
For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.
For determining the per cent. of Sulphur and Phosphorus in Iron or Steel..... 12
For each additional constituent of usual occurrence..... 4 00
For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10 00
For each additional constituent..... 2 00
For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12 50
For determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore.
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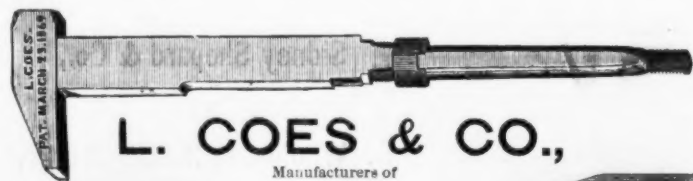


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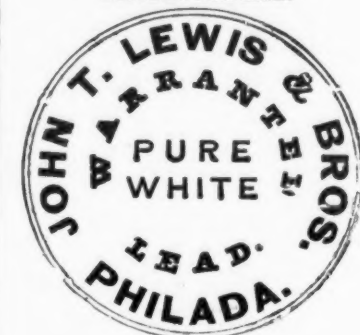
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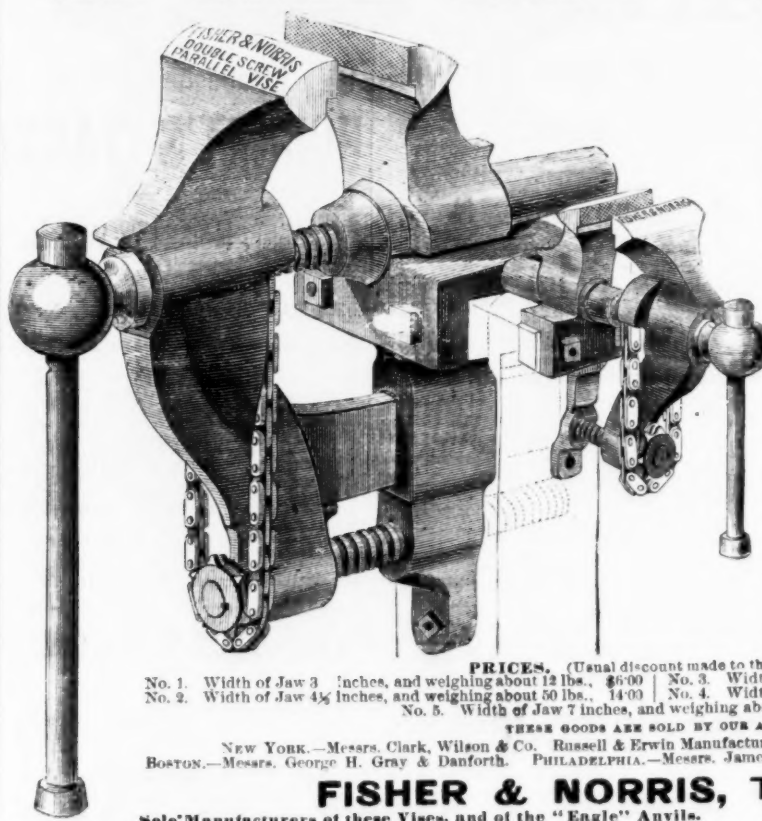
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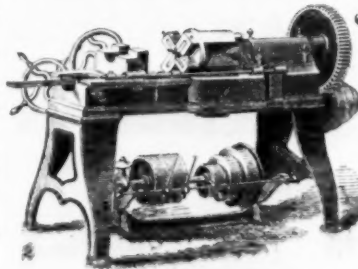
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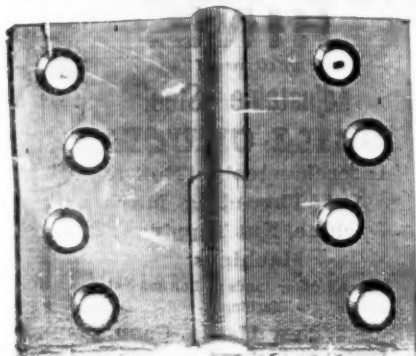
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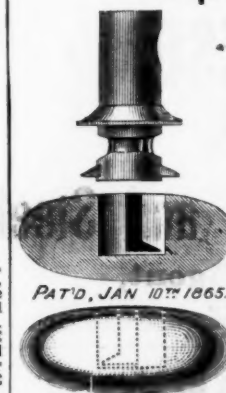
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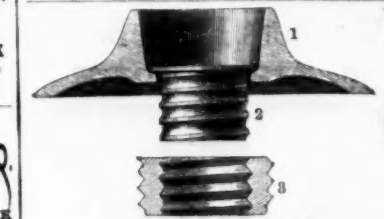
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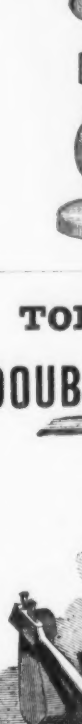
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Reported by Messrs. Sidney Shepard & Co.
Feb. 1, 1874.

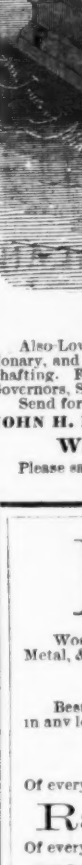
Angus—G. S. Cut, French, Swift & Co.		dis 30	\$1
Angus—Pierce's		dis 30	\$1
Snell Mfg. Co.		dis 30	\$1
Jennings		dis 30	\$1
Bella, Cow—Jaw's Genuine		dis 30	\$1
Bella—Smith's		dis 30	\$1
Bolts—Carriage and Tire, Square Neck		dis 70	\$10
Diamond Neck		dis 70	\$10
Braces—Bit, Spofford's Patent		dis 40	\$1
Brads, Cut		dis 50	\$1
Boards—Store, Brooks' Patent		dis 30	\$1
Boards—Brass		dis 30	\$1
Cast Loose Joint		dis 50	\$1
" Pin		dis 45	\$1
" Japanned		dis 45	\$1
" Silver Tipped		dis 25	\$1
Wrought Narrow		dis 50	\$1
" Broad, Loose Joint		dis 50	\$1
" Table and Rack Flare		dis 50	\$1
Wrought Butts, Loose Pin		dis 50	\$1
Belting—Rubber		dis 30	\$10
Leather new		dis 30	\$10
Brick—Bath (box of 2 doz) Best English		dis 10	\$1
" Rutherford		dis 10	\$1
Bulk Bore's—"Enterprise"		dis 30	\$1
Chalk—White, Carpenter's		dis 30	\$1
Blue		dis 30	\$1
Chisels—Firmers Socket		dis 40	\$1
Framing Socket		dis 40	\$1
Corner socket Chisels		dis 40	\$1
Slick's Carpenters		dis 40	\$1
Castings—Malleable		dis 10	\$1
Cherry Seeders		dis 12	\$1
Elbows—Corrugated		dis 30	\$1
Charcoal		dis 15	\$1
Files—Wheelers, Madden & Clemson's		dis 45	\$1
Freezers, Ice Cream—"Champion"		dis 35	\$1
Patent Self-Measuring		dis 20	\$1
Hinges—Window Blind		dis 10	\$1
Shepard's Standard and Clark's		dis 40	\$1
Wrought Strap and T		dis 30	\$1
Funnel, Black and Galvanized		dis 10	\$1
Fancy and Helmet		dis 10	\$1
Hammers—Marvols		dis 5	\$1
Yerkes & Pimble's		dis 5	\$1
Hooks and Staples—Wrought		dis 40	\$1
Hooks—Belt		dis 40	\$1
Hooks and Staples—Wrought		dis 40	\$1
Sad Irons		dis 45	\$1
Enameled		dis 45	\$1
Knives, Drawing—Oval No. 1		dis 40	\$1
Lanterns "Peeries"		dis 30	\$1
Gem, with guards		dis 15	\$1
Tabular		dis 15	\$1
Machines with Guards		dis 15	\$1
Machine, Coffee and Reading		dis 15	\$1
Mills, Coffee—Box and Slide, common		dis 15	\$1
Box Union and Eagle		dis 15	\$1
Box Union and Eagle		dis 15	\$1
Nails—Clout and Finishing		dis 15	\$1
Shoe		dis 15	\$1
Horse, Assable		dis 15	\$1
" Clinton		dis 15	\$1
" Finished and Pointed		dis 15	\$1
" 100 lbs		dis 15	\$1
Packing—Rubber		dis 15	\$1
Pencils, Slate—Soapstone		dis 15	\$1
Case Iron		dis 15	\$1
Pat's White Lead		dis 15	\$1
Rivets—Iron, Black and Tinned		dis 15	\$1
Copper		dis 15	\$1
Rules—Boxwood and Ivory, Stephens		dis 15	\$1
Screws—"American Screw Co"		dis 15	\$1
Flat Head, Brass		dis 15	\$1
Staples—Blind, Boardman's Pat.		dis 15	\$1
Staples—B. & B. Club Blued Top		dis 15	\$1
Straps, Skate—Russel and Smith		dis 15	\$1
Spoons, Iron, Tinned		dis 15	\$1
Plated Rogers' A No. 1		dis 30	\$5
Britannia		dis 40	\$30.5
Squares—Steel and Iron	new list	dis 10	\$35.5
Shoes, Horse—H. Burden & Sons	per keg	dis 40	\$10
Razor Blade—Wright Am. Iron		dis 10	\$10
Saws—Henry Distant & Sons		dis 40	\$10
Scales—Buffalo Scale Works		dis 25	\$10
Shears—Seymour's		dis 40	\$10
Trans. Steel Newhouse		dis 20	\$10
Tack—H. C. Campbell	\$12.00 14.25	dis 10	\$10
Views—Parallel, Buffalo		dis 15	\$10
Wrenches—Co's genuine		dis 40	\$10
Tafts Pattern		dis 40	\$10
Ware—French, Tinned and Iron		dis 25	\$10
Cast Iron Hollow		dis 25	\$10
Pin Plates—Add for each X		dis 25	\$10
Tin C. Campbell	\$12.00 14.25	dis 10	\$10
12x12	13-0 20x28 C.	dis 25	\$10
12x14	12-0 20x28 X.	dis 25	\$10
12x16	12-0 20x28 X.	dis 25	\$10
Pin Plates—Add for each X		dis 25	\$10
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Pin Plates—Add for each X		dis 25	

3/8 to 4 in.....	4.50	4 in.....	5.00
5/8 to 9-16 in.....	5.75	9-16 in.....	6.50

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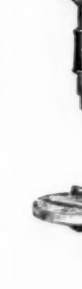
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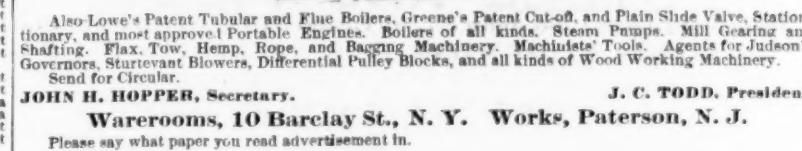


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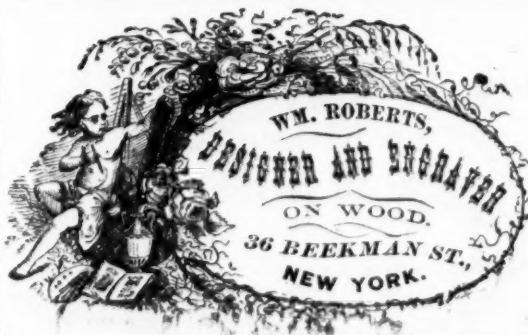
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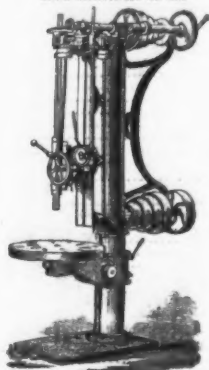
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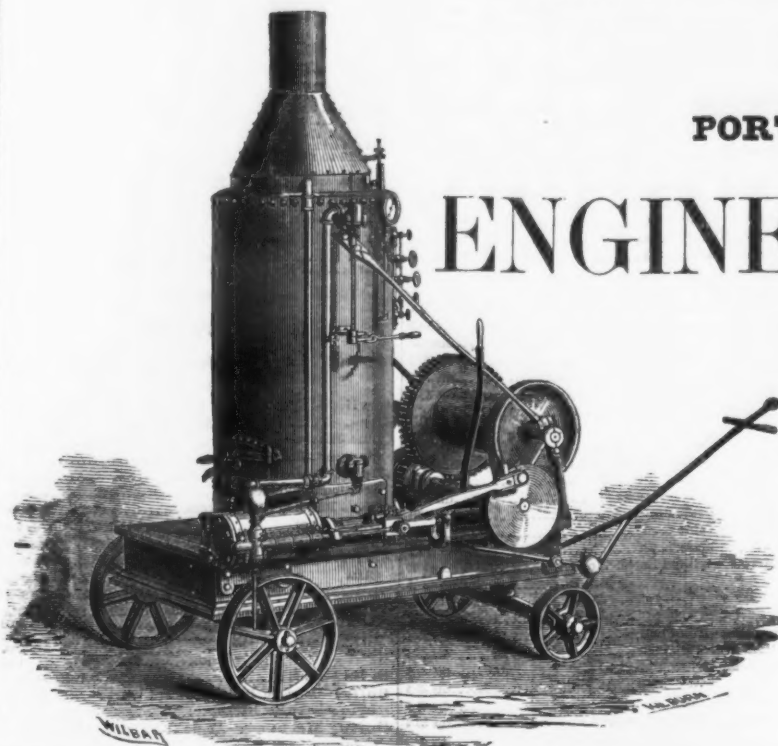
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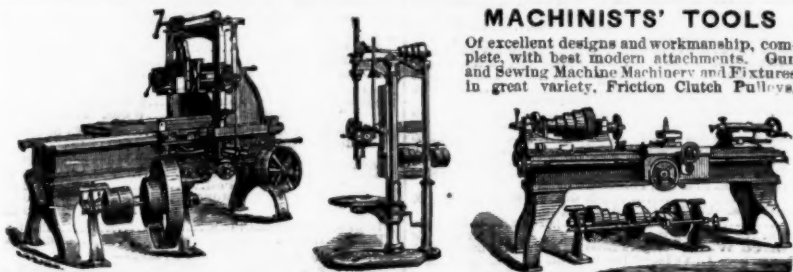
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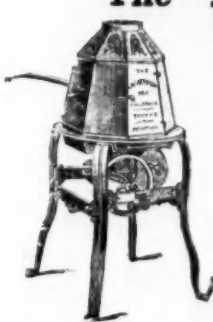
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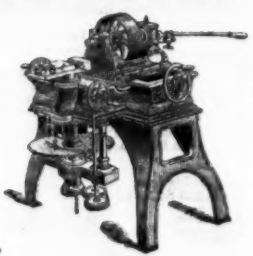
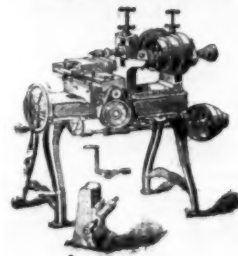
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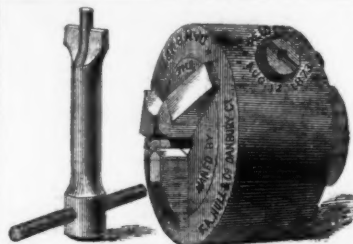
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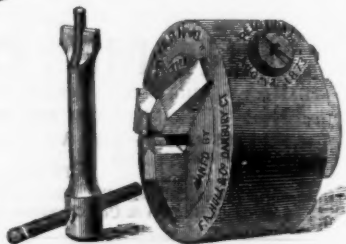
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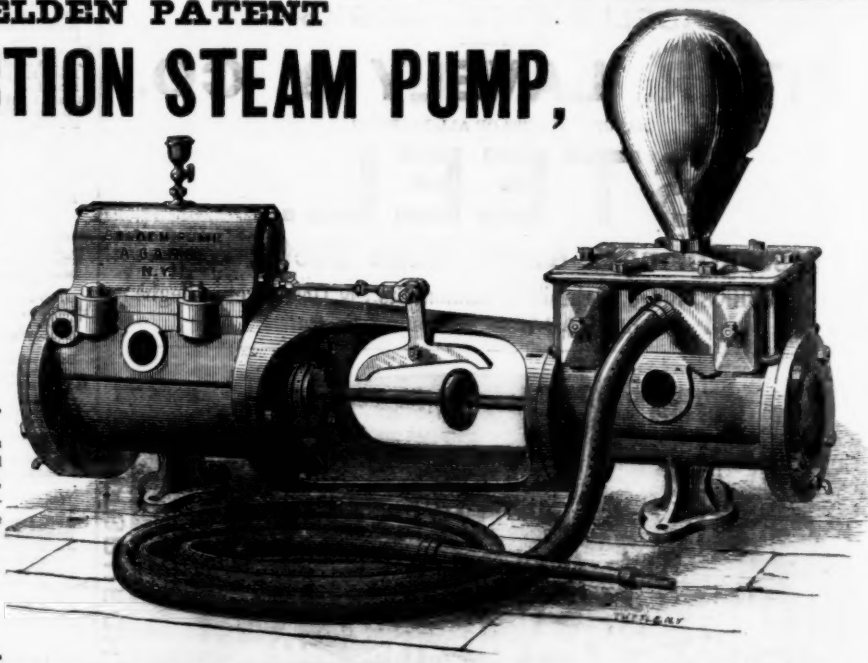
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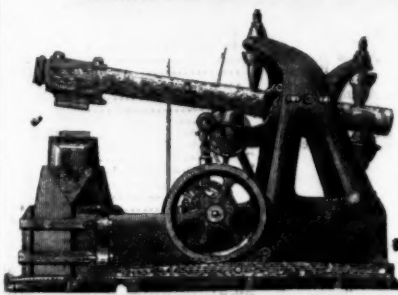
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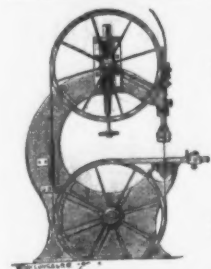
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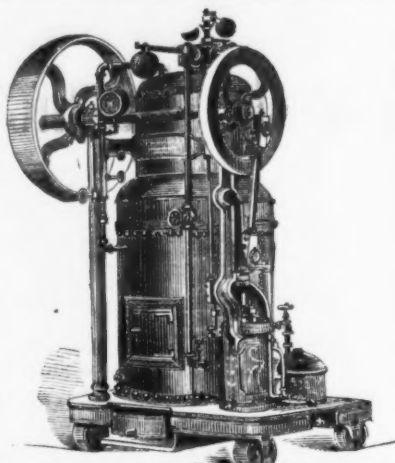
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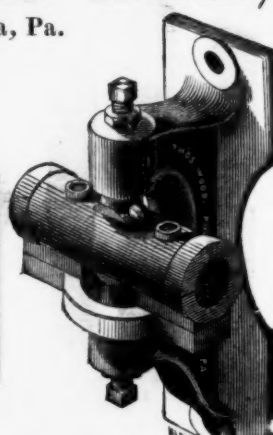
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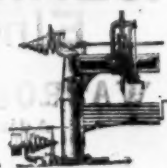
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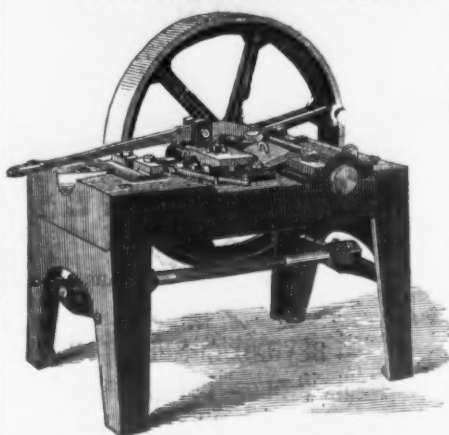
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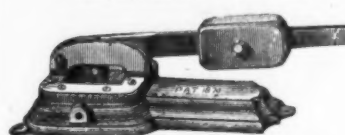
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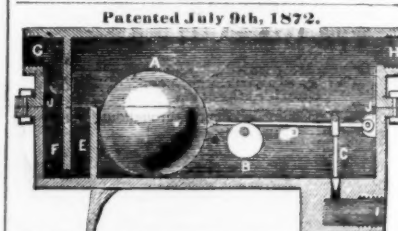
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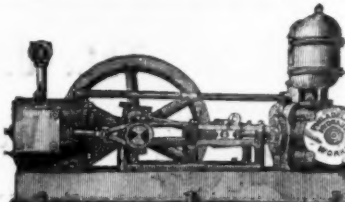
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